ELECTRICAL WEST

FEBRUARY 1961

A McGRAW-HILL PUBLICATION

1961 STATISTICAL ISSUE

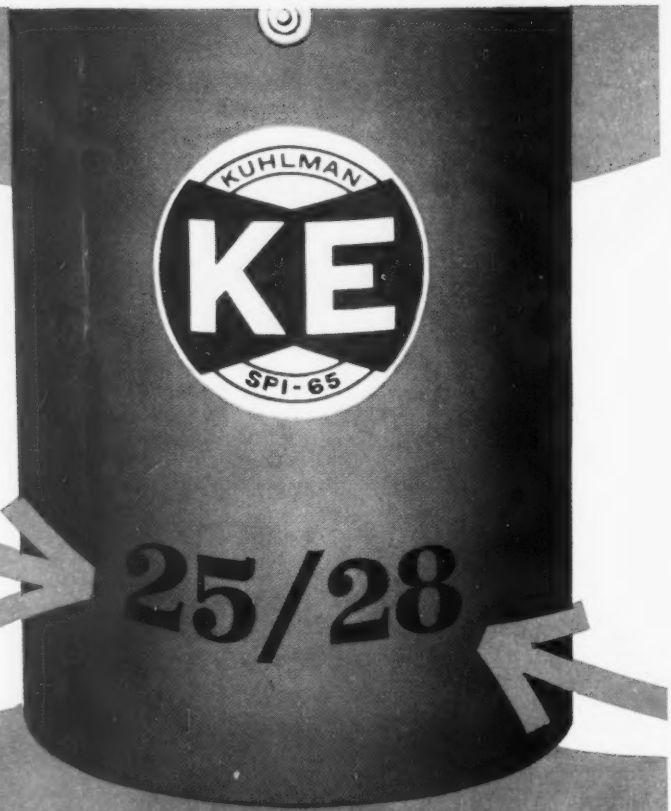
Western Budgets Up 23.4% From 1960 Spending

50 Cents

A CHOICE OF 2 RATINGS . . .

PLUS

BONUS LIFE FOR ALL OPERATING CONDITIONS



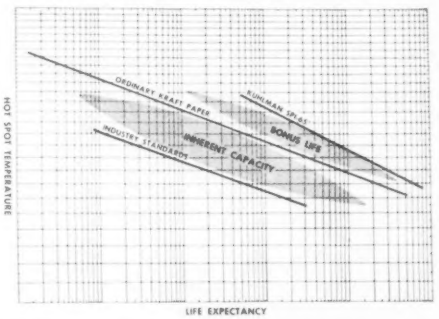
With Kuhlman you get a choice of two ratings (for example, 25KVA and 28KVA as shown above) and super insulation for longer than average operating life. Here are the facts.

First, thermal aging tests proved conclusively that Kuhlman uniform cooling and excellent thermal characteristics provide ample capacity for 12% more KVA per transformer within ASA-NEMA 65° maximum hot spot temperature.

Since extra capacity was inherent in Kuhlman design, it was a simple matter to uprate 12%. Tests also proved that SPI-65*—an improved, special treated insulation—was superior under all transformer thermal conditions to the standard kraft insulation used in most transformer design.

So don't sacrifice one for the other. Kuhlman gives you both—12% overload and longer than average operating life. Because Kuhlman offers capacity to spare, *plus* bonus life insulation. Don't settle for anything less. Order SPI-65* transformers direct from stock from your local Kuhlman representative and get bonus life for all operating conditions.

*Licensed under Westinghouse Insuldur® patent rights.



This life versus temperature test chart shows the inherent capacity and bonus life of Kuhlman transformers.

KUHLMAN TRANSFORMERS

Manufacturers of transformers since 1894

KUHLMAN ELECTRIC COMPANY, Birmingham, Michigan

WESTERN DIVISION • SALINAS, CALIFORNIA

What Is 'Economics' Anyhow?

It is harder to preserve than to found a Democracy. To preserve it we must prevent the poor from plundering the rich; we must not exhaust the public revenues by giving pay for the performance of public duties; we must prevent the growth of a pauper class.

POLITICS BY ARISTOTLE. 322 B. C.

We hear a lot about the "economic system." Generally it's discussed in big words with broad, vague meanings so dear to the eggheads. Actually it's the way in which men and women work together to produce the goods and services to supply three essential human wants:

1. The *basic* wants for food and shelter.
2. The *added* wants for convenience and comforts.
3. The *collective* wants for such things as national defense, education, social security, etc.

Fortunately for us, we were born into a society and system that has enabled us to satisfy most of these wants to a high degree. Many nations are barely able to provide even basic wants for their citizens. Our problem now is to preserve and expand our system against continuing pressures from within and without our boundaries.

Stripped of all its fancy terms, our way of life is based upon the rights of each individual as guaranteed him in the Constitution and the protection afforded him, with his consent, by his government. This social structure of ours, based on individual freedom, was a new concept in a world that had traveled the long road from slavery through feudalism and absolute monarchy. It left men free to enjoy the fruits of their individual labors and initiative. It unleashed a flood tide of human energy that has been parlayed into the high standard of living that we enjoy today.

Of course, all this did not happen without some serious jolts, bumps and dislocations. There were periods of overabundance followed by depression and unemployment; there were times when the over-ambitious threatened the welfare of the many. There were abuses and inequities. At such times, the people, either on their own initiative or through their elected representatives, consented to let the government intervene and control.

And these changes did not come about without cost. Every time they were required, people paid either with a loss of certain freedoms or a loss in savings (through taxes) or both.

Economic historians will note that, as the country changed from a basically agricultural nation to essentially an industrial nation, more and more opportunities arose for government intervention in the affairs of the individual. They also noticed that it became easier and easier to turn certain phases of our scheme of living over to a governmental body of one form or another. People just didn't seem to have the time to study the pros and cons of each action and to stop those that weren't really necessary.

Thus, it has come about that all of us are now giving up about *one-third of our earnings* to support all of these government activities that we, the people, have deemed necessary to protect us from ourselves and others. No man can say how much of this money is wisely spent. The fact does remain, however, that the price is high in terms of savings that could be used for other activities and in terms of freedom in achieving our individual goals in life.

Neither can any man say just how much of the country's earning power can be diverted to support governmental operations without risking disaster. Surely there is a breaking point in the functioning of our complex economic system just as surely as there was the straw that broke the camel's back. If that should happen we, as participants in the golden age of individual freedom, will have passed the point of no return. Future historians, looking back on this era, would rightly ascribe the failure to indifference and indulgence.

This, then, is the question that confronts you and me and every other citizen today. Do we dare ignore this accelerating trend toward greater, more costly governmental control of our daily lives?

In future discussions, various aspects of the care and feeding of the golden goose that is our American system will be outlined. Collectively, we hope they will provide a review of good citizenship principles and a base for a more critical appraisal of future decisions that we will have to make at the ballot box.

Advisory Board

Pacific Southwest Region

J. F. Davenport, Executive Vice-President
Southern California Edison Co., Los Angeles

R. H. Cockfield, General Sales Manager
Department of Water & Power, Los Angeles

Joseph Pengilly, Vice-President
Square D Co., Los Angeles

Leonard Hobbs, Vice-President
Smoot-Holman Co., Inglewood

H. C. Gerster, Manager, Western Zone
General Electric Supply Co., Los Angeles

Sidney Hill
Hill Electric Co., Los Angeles

C. M. Smith, Sales Manager
Fluor Corp., Los Angeles

Victor Hartley, Managing Director
PCEA, Los Angeles

Northern California Region

Walter Maytham, Vice-President
Westinghouse Electric Corp., San Francisco

Norman R. Sutherland, President
Pacific Gas & Electric Co., San Francisco

Fred Nicholas
F. M. Nicholas Co., San Francisco

Alfred H. Meyer, President
A. H. Meyer Co., San Francisco

Paul Churchill, Regional Manager
Line Material Industries, South San Francisco

George Abbett, President
Abbett Electric Co., San Francisco

Karl Bausch, Chief Electrical Engineer
Bechtel Corp., San Francisco

Walter Bayha
Bayha, Weir & Finato, San Francisco

Intermountain Region

R. D. Moody, Manager
Allis-Chalmers Mfg. Co., Denver

David B. Hyer Jr., President
Southern Colorado Power Co., Pueblo

D. E. Provost
Stearns Roger Mfg. Co., Denver

Ralph Johnson, Vice-President & General Manager, Sturgeon Electric Co., Denver

Ken G. Eaton, District Manager
Anaconda Wire & Cable Co., Denver

Howard Peterson
Peterson Co., Denver

W. W. Bowman, Director of Publicity
Utah Power & Light Co., Salt Lake City

A. E. Fleming, District Manager
General Electric Supply Co., Denver

Pacific Northwest Region

Eric Nelson
Shaffer & Nelson, Seattle

Ralph James
Northwestern Agencies, Seattle

R. B. Lane, President
Industrial Electric Co., Seattle

Beverly Travis, Consulting Engineer
Seattle

Eugene Starr, Chief Engineer
Bonneville Power Administration, Portland

Thomas W. Delzell, Chairman of Board
Portland General Electric Co., Portland

D. R. McClung, President
Pacific Power & Light Co., Portland

James F. Grieve, Vice-President
C. C. Moore, Engineers, Portland

Max Wood
Schwager-Wood Co., Portland

R. H. Sroufe, Executive Vice-President
Stubbs Electric Co., Portland

Alden F. Krieg, Managing Director
NELPA, Portland

Jack D. Stevens
Puget Sound Utilities Council, Seattle

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

C. W. Leihy, Publisher
Jack Robinson, Editor
Peggy Boyer, Associate Editor
Miriam Stuart, Editorial Assistant
Douglas Greenwald, Economics Consultant
Burkey Musselman, Washington News

George C. Tenney, President
W. A. Cyr, Consulting Editor
Hugh James, Engineering Editor
Roy Bloomberg, Pacific Northwest Region
Marvin Petal, Pacific Southwest Region
Frank Pitman, Intermountain Region

CONTENTS

VOL. 126, NO. 2 FEBRUARY 1961

Encapsulated Transformer Report 52
Western Budgets Up 23.4% 55
Calendar of Generation 56
The 1960 Statistical Review 58
Utilities Report on '61 60
Understanding Work Measurement 80
Reconcile Motor Heat by Tom Hughes 86

Cover: Line repair on Pacific Gas and Electric Co.'s Vaca-Contra Costa line near the Rio Vista crossing. Photo by Jack Robinson.

DEPARTMENTS

Contracting and Construction 83
Editorials 1, 26, 54
Meetings Calendar 29
News 30
Product Information Service 106
Product News 96
Advertising Index 113

ADVERTISING REPRESENTATIVES

ATLANTA 9: R. K. Burnet, 1375 Peachtree St., N. E., TR 5-0523; CHICAGO 11: W. C. McMurray Jr., 520 N. Michigan Ave., MO 4-5800; DALLAS 1: John G. Grant, 901 Vaughn Bldg., RI 7-9721; DENVER 2: John Patten, 1700 Broadway, AL 5-2981; DETROIT 26: Peter Hammond, 856 Penobscot Bldg., WO 2-1793; HOUSTON 25: Gene Holland, W-724 Prudential Bldg., JA 6-1281; LOS ANGELES 17: Bob McGinnis, 1125 W. Sixth St., HU 2-5450; NEW YORK 36: Francis X. Roberts, Nelson L. Bond Jr. (New England), 500 Fifth Ave., OX 5-5959; PITTSBURGH 22: Don Farris, 4 Gateway Center, EX 1-1314; PORTLAND 4: Scott Hubbard, 445 Pacific Bldg., CA 3-5118; SAN FRANCISCO 11: T. H. Carmody, Advertising Sales Manager, Peter B. Eben, Dick Alcorn, Bernice Johnston, Advertising Production Manager, 255 California St., DO 2-4600.

Offices: Boston, Cincinnati, Cleveland, Philadelphia, St. Louis, Tulsa

Electrical West (with which is consolidated The Journal of Electricity), February 1961, Vol. 126, No. 2 Published semimonthly except November when published trimonthly by McGraw-Hill Company of California, James H. McGraw (1860-1948) Founder. Office of publication, 235 N.W. Park Ave., Portland 9, Ore. See panel below for directions regarding subscriptions or change of address.

Executive, editorial, circulation and advertising offices: 255 California St., San Francisco 11, Calif. Donald C. McGraw, chairman of the board; George C. Tenney, president; John W. Otterson, vice-president; Thomas H. Carmody, secretary and treasurer.

Position and company connection must be indicated on subscription orders. Send to address shown in panel below. Subscription price includes the regular monthly issue, the news letter issue and the November directory issue. United States subscription rate $3 a year, single copies 50c. (November directory issue $1); Latin American Republics and Philippine Islands $6 a year; Canada $4 a year; all other countries $10 a year. Entered as second class matter, Dec. 17, 1956, at the post office at Portland, Ore., under the act of March 3, 1879. Printed in U. S. A. Title registered U. S. Patent Office.

© Copyright 1961, McGraw-Hill Company of California. All rights reserved.

Unconditional Guarantee: Our primary aim is to provide subscribers with a useful and valuable publication. Your comments and suggestions for improvement are encouraged and will be most welcome. The publisher, upon written request, agrees to refund the part of the subscription price applying to the remaining unfilled portion of the subscription if editorial service is unsatisfactory.

SUBSCRIPTIONS: Send subscription correspondence and change of address to Subscription Manager, Electrical West, 255 California St., San Francisco 11, Calif. Allow 30 days for change of address.

Postmaster: please send notice 3579 to Electrical West, 255 California St., San Francisco 11, Calif.

Residential installation of L-M Pad-Mount Transformer, showing locations of primary and secondary runs. L-M Permaline conduit permits pulling cable whenever necessary without destroying costly landscaping and driveway pavements.

Cut Long-Range Costs Of Underground With Cable In L-M Permaline Conduit

Direct burial fibre conduit makes it easy to replace cable for faults or load growth without costly damage to customer's shrubbery and driveways.

by **W. M. BLOOM**
Product Manager, Fibre Products
Line Material Industries

Long a leader in equipment for underground distribution, Line Material recognizes the cost problem for utilities. L-M has made many contributions toward cost cutting by originating the Pad-Mount transformer; with L-M Transclosures and Power Pedestals; and with a completely engineered system for fibre conduit.

While unprotected cable offers attractive savings in original cost of an underground installation, long-range cost can be substantial, when cable must be dug up because of failures, or replacements for load growth. Replacement of shrubbery and driveways can be costly; loss of customer good will is inestimable.

Cable in Permaline direct burial conduit can be pulled and replaced easily, economically. Ask the L-M Field Engineer for information and bulletins on L-M Permaline Conduit and underground distribution equipment; or write Line Material Industries, Milwaukee 1, Wis.

Long lengths, light weight, make L-M Permaline Fibre Conduit easy and economical to install. Available in 2-4" sizes, in 5, 8, and 10-foot lengths. Complete stocks at L-M Distributors and L-M's strategically located warehouses.

498

LINE MATERIAL® Industries

McGRAW-EDISON COMPANY

Permaline Fibre Conduit

McGRAW EDISON

DISTRIBUTION TRANSFORMERS · RECLOSERS, SECTIONALIZERS AND OIL SWITCHES · FUSE CUTOUTS AND FUSE LINKS
LIGHTNING ARRESTERS · POWER SWITCHING EQUIPMENT · PACKAGED SUBSTATIONS · CAPACITORS · REGULATORS
OUTDOOR LIGHTING · LINE CONSTRUCTION MATERIALS · PORCELAIN INSULATORS · FIBRE PIPE AND CONDUIT

WHAT DO YOU LOOK FOR IN CUTOUTS ?

Most of the cutouts being manufactured today will operate at rated voltage, carry rated current, and interrupt a range of fault currents up to the maximum for which they are rated.

These are basic requirements and cannot be compromised.

But, when you compare the design extras, you get a different picture. Some units are stripped, with little attempt to provide any of the niceties. Others have a few plus features but are short in the critical areas. A very few are solid in performance with a well-rounded measure of the extras.

However, even the most dedicated manufacturer is bound by the laws of economics. No matter how zealous his attempts may be to produce the super-deluxe cutout, costs invariably limit the extent to which extras can be added.

It really boils down to a matter of judgment. The experienced manufacturer, sophisticated in the art of cutout design screens out the frills, avoiding a hodge-podge of specious advantages. His product is sound, reliable, and easy to handle, with margins of safety beyond the minimum.

As always, the buyer must ultimately make the final decision, choosing the cutout with the features he values most highly.

To this man we submit our BV-33-F. We believe that it requires fewer concessions; that it answers his needs for a sound, dependable cutout more satisfactorily than any other being manufactured today. And we point to the fact that these features have been incorporated without compromising any sound design principles.

As one of the oldest manufacturers in this field, Southern States has pioneered and co-pioneered many of the features now considered necessary on a modern cutout. Such things as self-locking hinges, sleet hoods, positive latching, dropout action, non-ferrous live parts, high pressure line contacts, and provisions for easy hookstick handling were standard on Southern States cutouts as early as 1931.

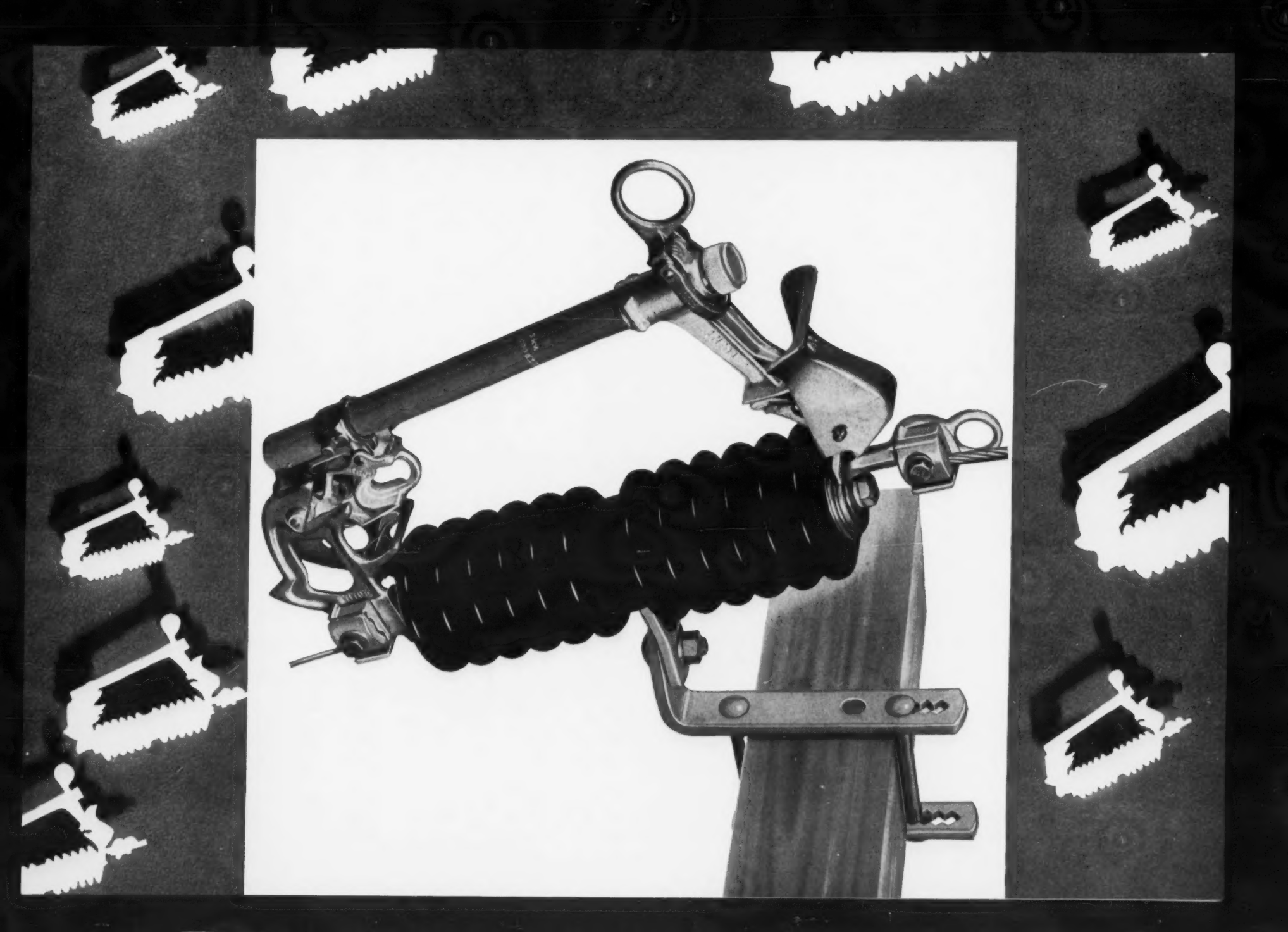
In the last few years such features as the expendable cap, high pressure contacts, 180° tube stops, bird-proofing, improved link ejectors, operating ring for unlatching fuse holder, silver-plated contact surfaces, and clamp type universal terminals have been incorporated.

A careful look at Southern States BV-33-F, can make your decision easier when choosing a cutout.

We welcome your inquiry. For details on this unit refer to Bulletin 580C or check with our representative.

SOUTHERN STATES
HAMPTON, GEORGIA

IN CANADA: DOMINION CUTOUT CO., LTD., TORONTO



Your best conductor protection is and the best armor rods are **ARMOR RODS**

FANNER Superforms*

WORLD'S FIRST ARMOR ROD MAKER, YOUR *SERVICE-CONTINUITY PARTNER*

plus values in
RESEARCH/DEVELOPMENT
Punishing tests, indoors and outdoors, are constantly conducted for product improvement and new developments.

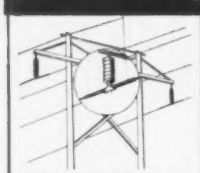
plus values in
RAW MATERIALS
Exacting tests and material inspection assure the finest quality in all Fanner Superformed products.

plus values in
PRECISION MANUFACTURE
Scrupulous care in manufacturing, in testing, in handling and in packaging assure on-the-job dependability.

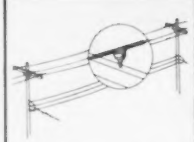
Of course you use armor rods for their economy and safety in construction, maintenance and repair of overhead lines. But, above all, you buy them because they are the most *dependable* accessory yet developed for protecting overhead conductors against wind-induced vibration at supporting points.

Fanner Superforms are of the highest quality. At every step . . . in development, materials, manufacture and packaging . . . Fanner takes extra care to give you the finest armor rods available, *at no extra cost*. Ask our representative for details. He will give you *plus assistance with your T & D problems*, too!

A FEW FANNER Superforms . . . and FINEST PLASTIC PRODUCTS

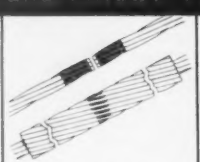


ARMOR RODS
. . . Protect long spans at supports



LINEGUARDS
. . . Protect short spans at supports

FANNGRIPS
. . . For dead-ending strands or conductors



FANNSPLICES
. . . For joining or patching strands

TREEGUARDS
. . . Protect conductor surface covering

KOVER-GARDS
. . . Protect surface-mounted conductors

*A superior forming method in accordance with Patents No. 2,769,478 and 2,588,663—other patents applied for.

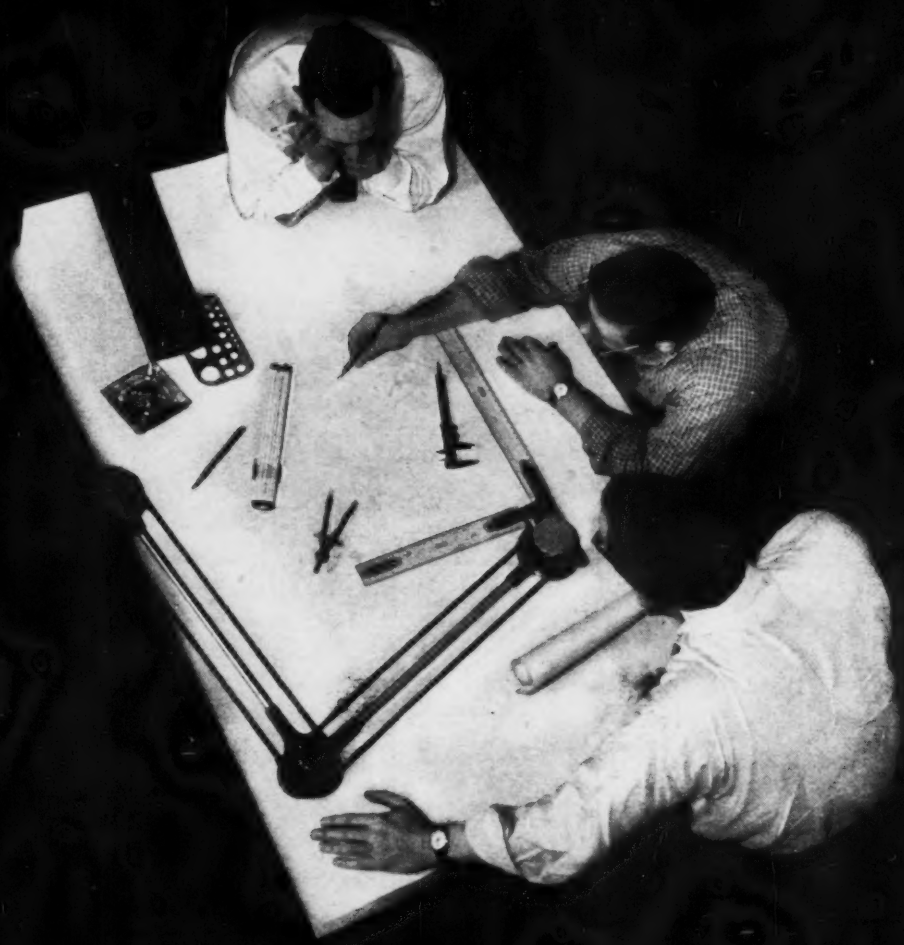
THE FANNER MANUFACTURING COMPANY
Brookside Park • Cleveland 9, Ohio

DIVISION OF TEXTRON, INC.

Fine Fanner Superformed Products

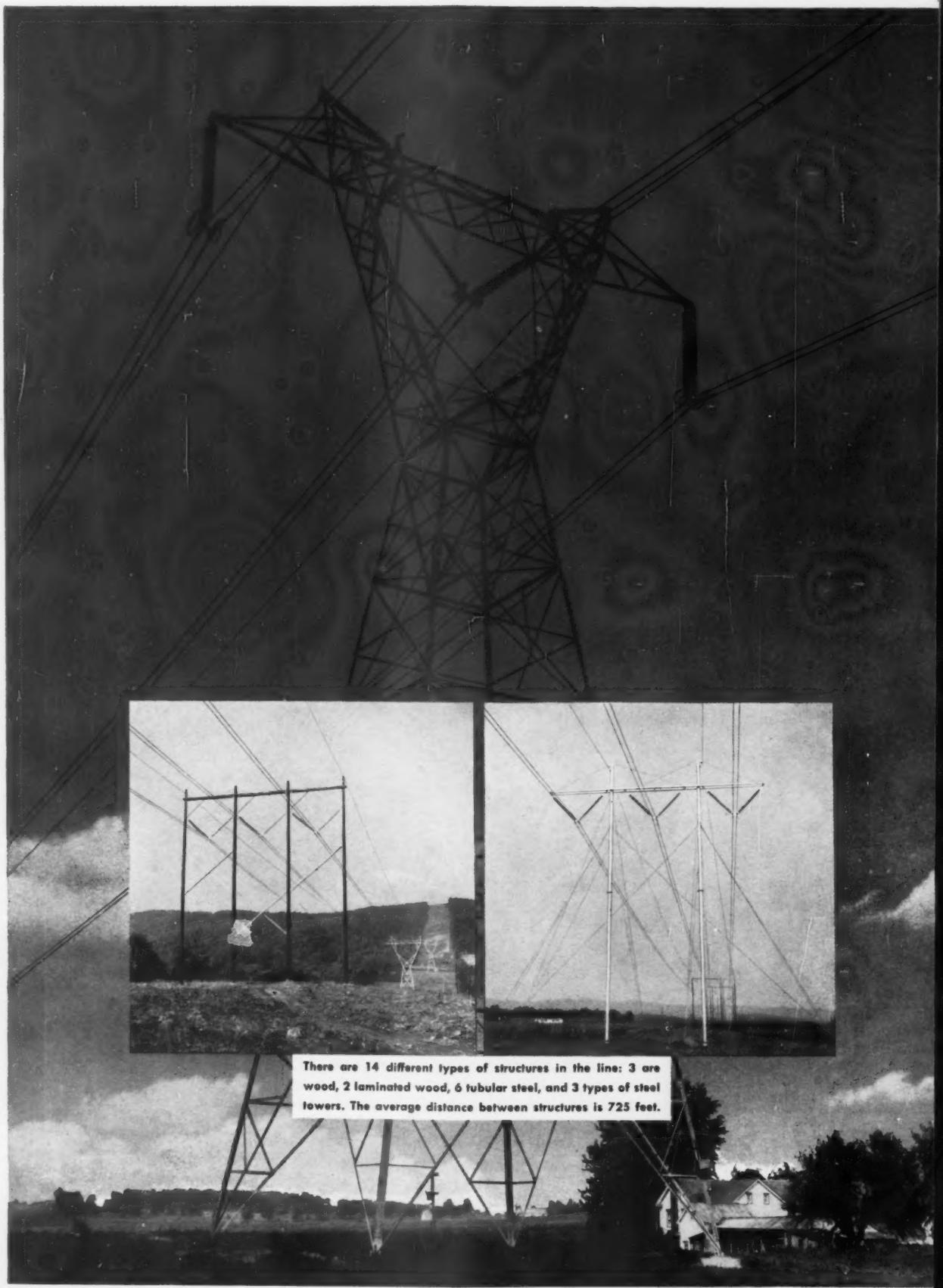
A-9635A

CONCENTRATION



RT&E was founded and operates today on a very basic premise: do one thing and do it better than anyone else. That's why you'll find engineers at RT&E thinking and doing things with transformers that nobody else has ever done . . . why engineering talent at RT&E is concentrated on *one* idea . . . a better transformer. This concentration can pay off for you. Proof? Write for Bulletin 101.

RT&E Corporation · Waukesha, Wisconsin · Portland, Oregon · Arlington, Texas



There are 14 different types of structures in the line: 3 are wood, 2 laminated wood, 6 tubular steel, and 3 types of steel towers. The average distance between structures is 725 feet.

AMERICA'S "BIG-VOLT" LINE protected by ALUMOWELD OVERHEAD GROUND WIRE

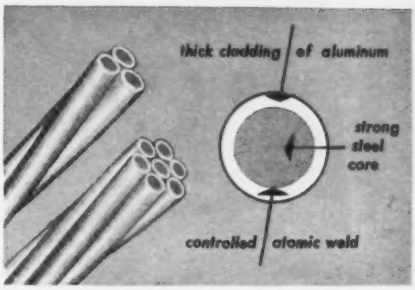
Like the famed "Big Inch" in the oil industry, Pennsylvania Electric Company's "Big Volt," its new 460-KV transmission line, represents a bold step forward in supplying the growing energy needs of America.

To protect the highest voltage operational line in America from lightning and transient currents, Penelec is using Alumoweld Overhead Ground Wire. This dependable, low-cost shield wire has three times the electrical conductance of steel, is just as strong and weighs 18% less. It has the same long life as solid aluminum.

Alumoweld is the result of the first successful cladding of a *thick* layer of pure aluminum over a high-strength steel core. The concentric aluminum covering comprises 25% of the cross-sectional area of each wire. Its high strength-to-weight ratio—higher than any other overhead ground wire—permits stringing with greater mid-span clearance to provide maximum lightning protection. Alumoweld's excellent conductivity assures reliable operation of protective relays and effectively discharges transient currents to ground.

Order Alumoweld Overhead Ground Wire and get Low-Cost, Long-Life Protection for your transmission lines.

For more complete Alumoweld data send for Engineering Bulletin E.D. 3000.



A seven-strand Alumoweld Overhead Ground Wire (7 No. 6 Awg wires), approximately ½-inch in diameter with a breaking strength of over 22,700 pounds, is used to protect the highest voltage transmission line in America.

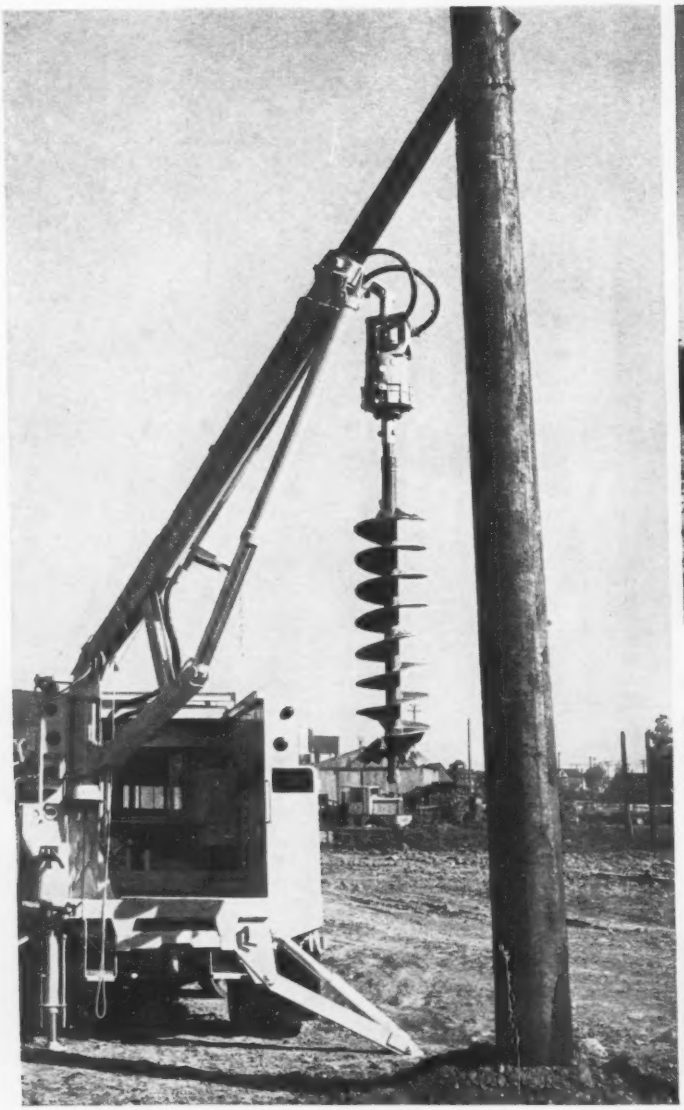
ALUMOWELD®

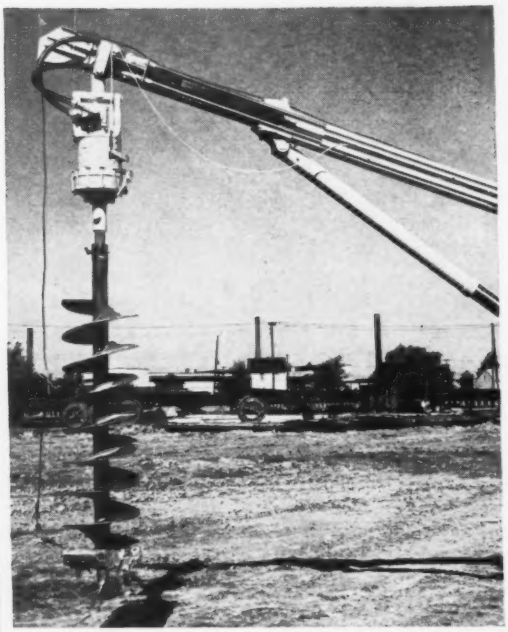
COPPERWELD STEEL COMPANY

WIRE AND CABLE DIVISION Glassport, Pa.

For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

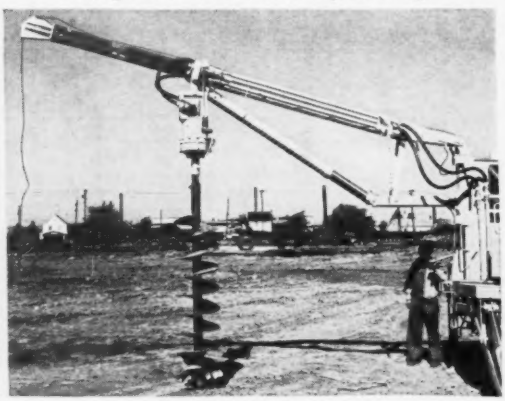
Canadian Distributor: NORTHERN ELECTRIC COMPANY LIMITED





Semi-automatic device locks borer on end of extendible boom for digging.

Borer automatically locks to end of main boom when retracted, leaving extendible boom free for pole setting.



Diagnosis: High Feed Pressure

Strongest corner-mounted derrick in the field is Holan's 7500 — a powerful, time-saving derrick that operates in an arc behind and to the right side of the truck.

Here's power . . . real power . . . all the up and down feed pressure needed to drive any derrick-suspended digger. And more than that, it's the only corner-mounted derrick built capable of handling Holan's rugged 3-speed 5400 Earth Borer.

Jobs can go ahead on schedule — even in alleys, narrow streets and congested areas because positioning problems are ended. Parked parallel to the curb, the 7500 swings over . . . even over fences and guard rails . . . reaches out . . . and digs deep holes, sets poles up to 70 feet in length.

The 7500 is engineered as a complete unit to avoid body and derrick stresses . . . can "live boom" 8,500 pounds, winch 10,000 pounds.

A semi-automatic locking device moves the earth borer onto the extendible boom for digging . . . or to its main boom storage position.

The 7500 . . . shown here mounted on the left side . . . is available mounted on the right side. It reaches up 27'-6", 18½' behind the truck, and beyond the right side 12'-3" (left-side mount) and 16'-10" (right-side mount) with boom extended.

Before you buy any corner-mounted derrick, write us — or call your Holan Field Representative — for complete details.

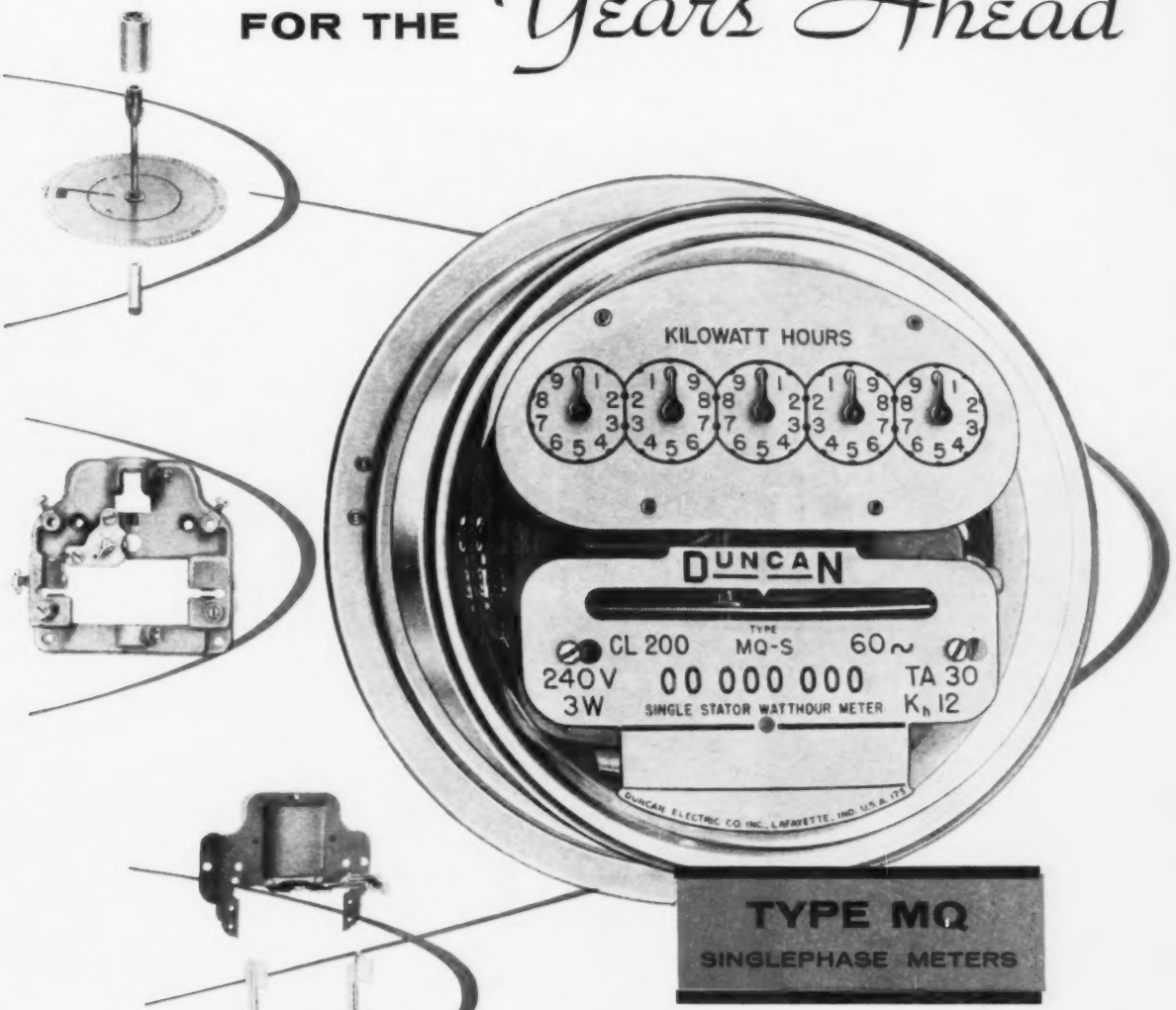
Holan Corporation, 4100 West 150th Street, Cleveland 35, Ohio

Holan

Subsidiary of THE OHIO BRASS COMPANY

HOLAN

FOR THE *Years Ahead*


KILOWATT HOURS
DUNCAN
TYPE
CL 200 MQ-S 60~
240V 00 000 000 TA 30
3W SINGLE STATOR WATTHOUR METER Kh 12
DUNCAN ELECTRIC CO. INC., LAFAYETTE, IND. U.S.A.

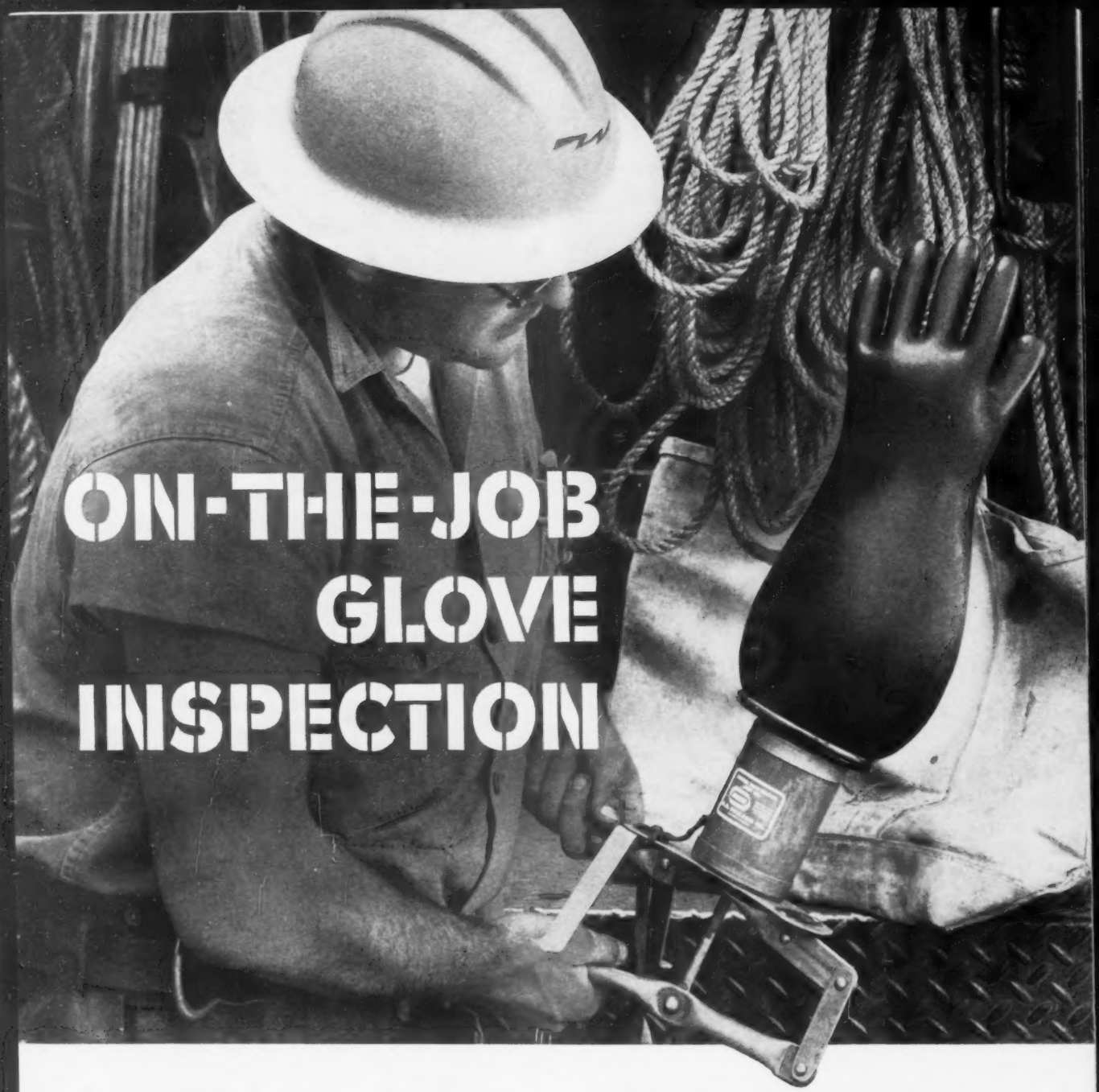
TYPE MQ
SINGLEPHASE METERS

Building a *truly better* watthour meter is a goal that might seem impossible in accomplishment when compared with standards already attained. With careful deliberation and decision, Duncan has achieved this end in the TYPE MQ meter, now in full production in all Classes—10, 100 and 200.

The meter incorporates Duncan's shielded top magnetic bearing. The new design also provides for front removal of the rotor through new positioning of high energy, surge-resistant Alnico damping magnets. Positive end play control of rotor . . . separable electromagnets . . . simplified assembly and adjustment are "user approved" features. *Let us give you the complete story.*

"Thinking Ahead . . . Moving Ahead
. . . to stay Ahead of Demand"

WATTHOUR METERS • MOUNTING DEVICES • DEMAND METERS



NEW/MATIC PORTABLE GLOVE TESTER

Test linemen's gloves immediately, efficiently, **anywhere** with the new Bullard lightweight NEW/MATIC Tester! So compact and economical that it can be standard equipment on every line truck.

Now—any time or any place—linemen can **daily double-check** the airtight safety of their gloves with just a few strokes of the pump. The Bullard NEW/MATIC Tester is available in two sizes: Catalog No. GT-A for glove size 9 with 14″, 16″ or 18″ gauntlet, and glove size 10 with 14″ or 16″ gauntlet; Catalog No. GT-B for glove size 10 with 18″ gauntlet, and glove size 11 with 14″, 16″ or 18″ gauntlet.

BULLARD
INDUSTRIAL SAFETY EQUIPMENT

Call your Bullard Distributor today for full details and demonstration . . . or write

E. D. BULLARD COMPANY
SAUSALITO • CALIFORNIA
6719 SOUTH FIGUEROA, LOS ANGELES

TEST GLOVES DAILY FOR CRACKS • TEARS • PUNCTURES

COPYRIGHT 1961, E. D. BULLARD COMPANY

ALLIS-CHALMERS

ORIGINATORS OF 5/8% STEP REGULATORS

Insist on complete UNIT CONSTRUCTION to speed untanking...

bring maintenance out into the open

Unit construction of the JFR regulator simplifies untanking — brings all components and connections into full view! You make *all* internal inspections without breaking any electrical or mechanical connection. And you can *operate* the regulator for testing while the unit is untanked.

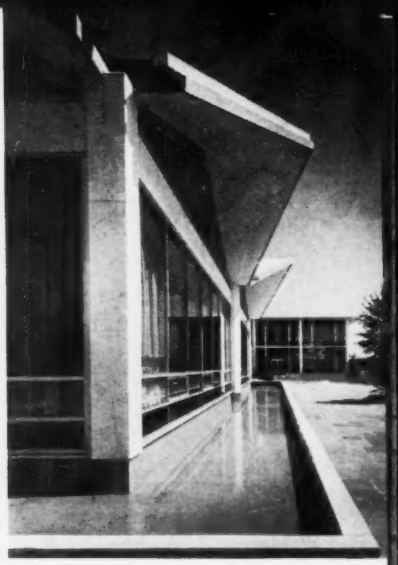
More JFR maintenance cost-cutting features: Oil sight gauge lets you check oil level at a glance. Unidirectional breather removes moisture and gases formed during tap changes. Quick-break mechanism is simple, rugged with a minimum number of moving parts for long, maintenance-free life. Externally-mounted by-pass arrester offers positive, visual proof of series winding protection.

Should you need a regulator replacement part — A-C maintains nationwide stocks. *Specify* **Allis-Chalmers** *Regulators . . . call, write or wire your nearby A-C office.*

Exclusive CALIBAND control cuts control-setting time without changing customer voltage or line-drop compensator settings.

Caliband is an Allis-Chalmers trademark.

A-1419



Exterior of Prudential's new building, one of the show places of southern New Jersey.

Architect: Frank Grad & Sons, Newark, N.J.
General Contractor: Massett Building Company, Atlantic City, N.J.
Electrical Contractor: William E. Snell Electrical Construction Company, Vineland, N.J.
SPANG Distributor: Serv-U-Electric Company, Penns Grove, N.J.

◀ Superintendent George Hess reviews wiring blue print at job site. Spang Conduit provides top-quality wiring protection in new Prudential Life Building. These two-story facilities provide 200,000 sq. ft. of space, house 1,000 employees, cost $3,000,000.

Q. "WHAT DO YOU THINK OF SPANG CONDUIT QUALITY, MR. HESS?"

A. "SPANG is uniform in diameter and straightness, and the finish is very good!"

SPANG® CONDUIT

That's George Hess speaking. He was superintendent for William E. Snell Electrical Construction Company, Vineland, N.J. We interviewed him and Howard Franz, Snell field representative, at the new Prudential Life Insurance Company of America Building at Linwood, N.J., where they were making a SPANG Steel Conduit installation.

Mr. Franz said, "SPANG Conduit bends, threads and cuts well. The galvanized finish doesn't chip, crack or blister during bending. We've had no problems of white rust or other corrosion, even in this salt-air region.

"SPANG has a smooth interior finish—no burrs, snags or imperfections to cause wire-pulling problems. We know this installation will last the life of the building."

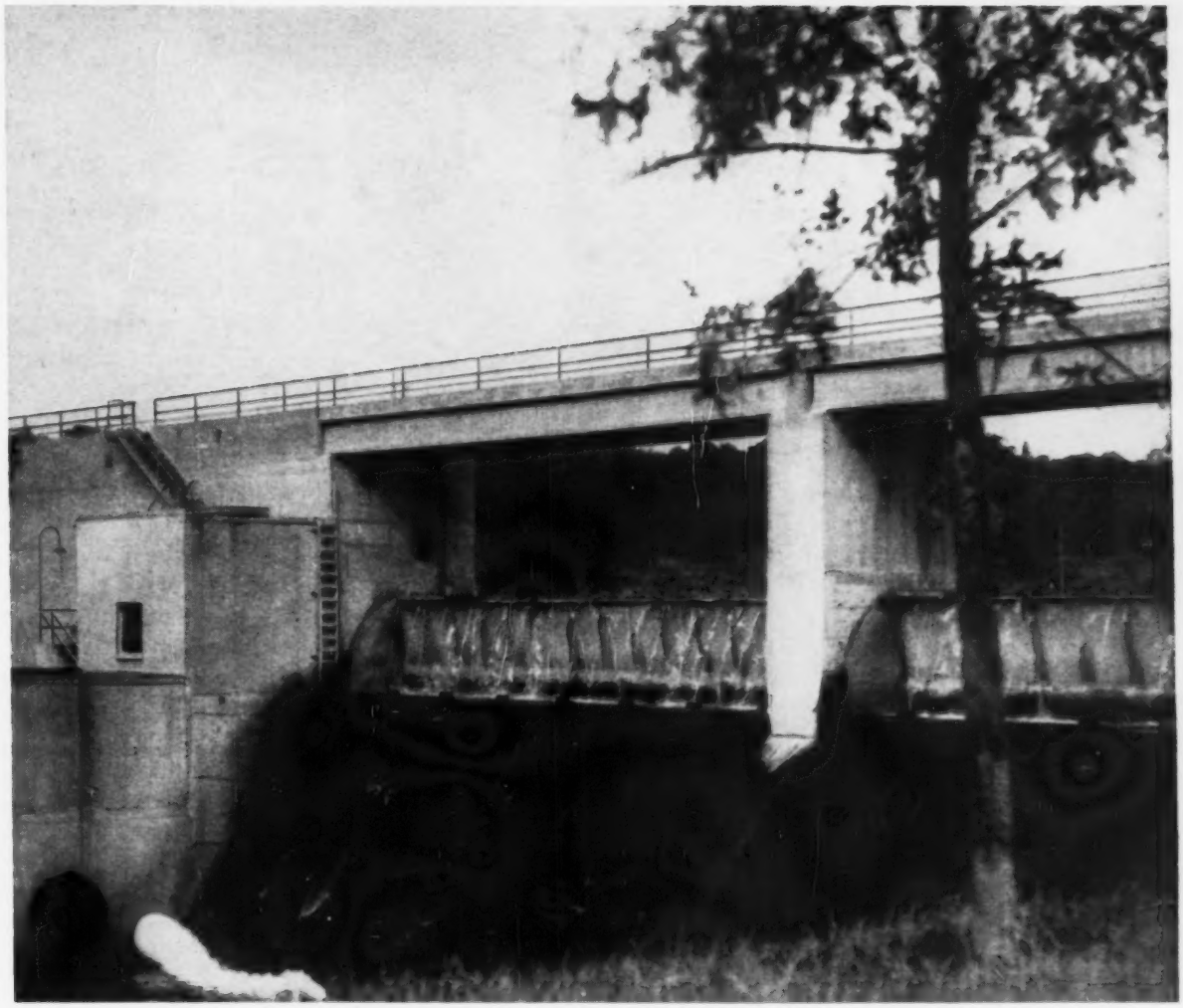
That's SPANG quality at work!

. . . and it will work for you, too—in SPANG Steel HD Galvanized, SPANG Steel Black Enameled, SPANGLEAM EMT and SPANG Rigid Aluminum Conduit. Try them and see! For quality service on all your electrical requirements, call your nearby SPANG Distributor.

SPANG Conduit is one of the many fine products produced by *National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pennsylvania.*

ARMCO **National Supply Division**

ALLIS-CHALMERS



The two Bascule gates at the Lake deForest Dam, Spring Valley Waterworks & Supply Co., N. Y., each 50 feet long by 5 feet high. A-C also provided 24- and 12-inch **Howell-Bunger** free-discharge valves, installed in the left-hand abutment, to regulate minimum flow requirements.

Bascule gates provide the extra storage you need...

save 80 to 90% of new dam costs

You can add impressive capacity and higher head to your dam by equipping it with *Bascule* gates . . . at a fraction of the cost of building a dam of equivalent capacity. *Bascule* gates are readily installed for both new and existing reservoirs, frequently in less than 9 months (compared to the 2 years or more needed for new dam construction).

By their very nature, these gates add capacity without requiring overhead structures and without increasing flood level, a dual problem not resolved with other gates. Since they discharge over the top, level regulation is facilitated . . . ice goes over the top, so they can function as ice breakers.

There's added safety too: extreme water pressure can initiate hydraulic lowering of the gate to maintain safe upstream or reservoir water levels. The result: a fail-safe installation. Or, where downstream conditions are the concern, a mechanical operator can be employed.

• • •

These unique Bascule gates are one more exclusive from Allis-Chalmers . . . proof again that A-C is your surest source of water control equipment designed to stretch investment dollars. For details, contact your local A-C representative or write to **Allis-Chalmers,** *Hydraulic Division, York, Pennsylvania.* A-1417

Bascule and Howell-Bunger are Allis-Chalmers trademarks.

NEW PENNSYLVANIA Fault-Gas Detector* discloses incipient faults in transformers

*Patent pending

Incipient-fault detector* on the job. Gas valved from the transformer is first moved through a mixing chamber and then the resultant gases are passed over the heated detector-element leg of a bridge circuit. The combustible content of the mixture changes the temperature and resistance of the element. Special bottles on the work table, one in its shipping carton, are used when gas samples are sent to the factory for analyses.

Pennsylvania development

Through extensive research and field testing, Pennsylvania has developed a detector, making it possible to anticipate failures of inert-gas-protected oil-filled transformers and regulators. Detection of faults in the incipient stage can avert major system disturbances and extensive equipment damage. With the new detector, tests for low-energy faults can be made while the equipment is in service, carrying load. Since such faults usually precede complete failure by weeks or months, an outage for inspection or maintenance can be conveniently and economically planned.

Principle of operation

The sensitive, accurate new detector, developed for the use of the electrical power industry, operates on a new principle: the analysis of the composite of combustible foreign gases mixed with the nitrogen in the gas space above the oil. Low-energy faults—insidious minute arcing or excessive local heating—cause the formation of numerous gases from materials (oil, solid insulation and metals) in transformers. Hundreds of laboratory tests disclose that at least 16 gases, many combustible, can be produced from decomposition of transformer materials in various combinations. Some of these gases—acetylene for example—are so quickly absorbed by the oil that they are seldom, if ever, detected by analysis of the gas above the oil. Others will accumulate. Types and quantities are keys to incipient fault detection.

Proof of method

Field and laboratory investigations confirm that a measure of the percentage of significant gases—separately or in combination—and the trend of change between periodic tests, indicate the presence and seriousness of low-energy faults. This was verified by tests on gas samples from over 300 transformers in service. Tests disclosed, by the high percentage of combustible gas, that seven of these transformers, produced by several manufacturers, had incipient faults in advanced stages. Inspections confirmed the gas analyses. Incipient fault conditions found were corrected before total failure and serious damage occurred.

Practical instrument

Analyzing equipment has been developed for routine testing by the electrical power industry. It operates on the principle of resistance change of a detector element, responding to the summation of combustible gases produced by low-energy faults. The remarkable accuracy and sensitivity of summation analyses, using the new portable incipient-fault detector, have been repeatedly confirmed. Comparison tests have been made with highly sensitive laboratory equipment, capable of identifying and accurately measuring the quantity of the separate gases in a sample. A total of the separate results has corresponded to the value from the summation analysis.

Preventive tool can be purchased

Used as a preventive-maintenance tool, Pennsylvania's incipient-fault detector can protect service and reduce damage from failures. Portable equipment is available for purchase. Field service can be secured or gas samples can be sent to the factory for laboratory analyses. For technical and cost information, write on your company letterhead to Service Department, Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pennsylvania.

McGRAW-EDISON

Pennsylvania Transformer Division, McGraw-Edison Company

Announcing an exclusive new development in fibre conduit

A development of Orangeburg and Flintkote Research Laboratories, new *klean-kote* Orangeburg Fibre Conduit has a tough, non-brittle protective coating for cleaner, safer handling. To you and your men, this literally means cleaner hands, cleaner clothes and little or no chance of irritation. In addition, new *klean-kote* travels better, weathers better—and makes a stronger-than-ever joint.

Nothing has been changed in the traditional fine quality of the Orangeburg product. New *klean-kote* is just what the name implies — *a clean coating*. Beneath it lies the same quality product, manufactured with the same painstaking care which has made Orangeburg the best-known, best-selling line in America. Ask your wholesaler to show you a length of new *klean-kote* Orangeburg now.

Cleaner hands Cleaner clothes No irritation

klean-kote*
ORANGEBURG®
Fibre Conduit

FLINTKOTE

Orangeburg Manufacturing Co., Orangeburg, New York. Division of The Flintkote Company, Manufacturer of America's Broadest Line of Building Products

*KLEAN-KOTE IS A TRADE MARK. U.S. PATENT APPLIED FOR. ORANGEBURG KLEAN-KOTE IS DISTRIBUTED BY GRAYBAR ELECTRIC CO. AND GENERAL ELECTRIC SUPPLY CO. WITH BRANCHES AND STOCKS IN PRINCIPAL CITIES.

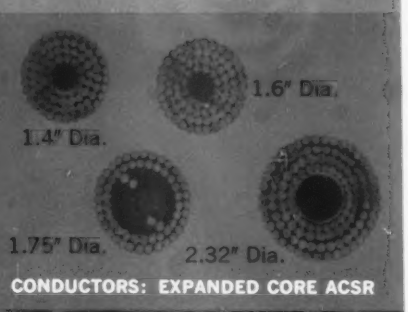
Transmitting increasingly large blocks of power over long distances without service interruption is the objective of the engineers who designed the

PENELEC 460 KV

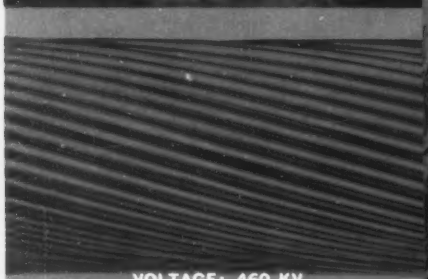
thirteen-mile experimental line from Claysburg to Saxton, Pa. Almost all of the components — structures, conductors, insulators, hardware, etc. — were specially manufactured or adapted to accommodate extra-high voltages, as well as excessive mechanical stresses imposed by rugged terrain, high tensions, and extreme weather conditions. How each component will perform under extended EHV operation is yet to be determined. Collaborating with Pennsylvania Electric Company in this ambitious experiment is the Research & Engineering Center of Preformed Line Products Company, who have contributed for installation and comparative analysis a group of protective products designated as...

Planned Line Protection for

TENSIONS: UP TO 27,500 LBS.



CONDUCTORS: EXPANDED CORE ACSR



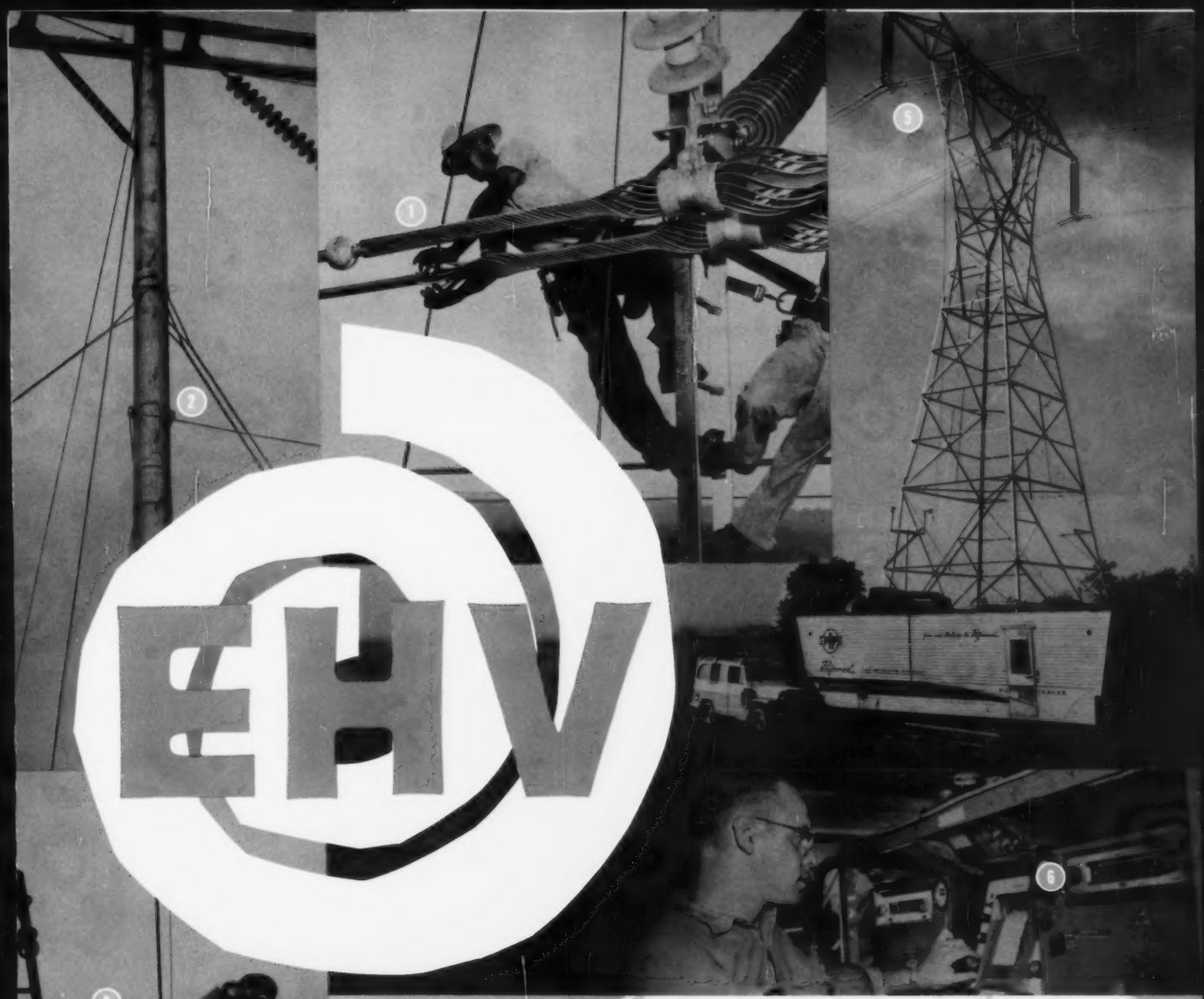
VOLTAGE: 460 KV

WEATHER: VARIABLE

TERRAIN: VARIABLE — MOUNTAINS AND PLAINS

The products in this advertisement are manufactured under one or more of the following: U. S. Patent No. 2,609,653; 2,691,865; 2,761,273; 2,722,393; and 2,959,632; other patents pending.

PLP® is a trademark which is registered in the U.S. Patent Office and is the property of Preformed Line Products Company.
PREFORMED, GUY-GRIP and ARMOR-GRIP are additional trademarks of Preformed Line Products Company.



(1) Clipping in a two-conductor bundle of 1.75" expanded ACSR with ARMOR-GRIP Suspension (AGS), the assembly that floats the conductor on a cushion of neoprene and eliminates line failures by distributing stresses over a wide area support. PREFORMED Rod End Corona Shields eliminate corona and radio influence at operating voltages.

(2) GUY-GRIP Dead-Ends are used at the top and anchor locations of ½" and ⅝" EHS guy strand which support a lightweight steel "H" frame structure. Dead-Ends at the top are specially designed with an extra large loop to accommodate 21" diameter tubular steel uprights.

(3) Lineman, clipping in 1.75" bundled ACSR conductor at an angle structure, applies PREFORMED Armor Rods to protect conductors from damage which might result from extended vibration, chafing, arc-over, and concentrated clamping stresses. No tools are required to apply PREFORMED Armor Rods . . . an added benefit on bundled conductors.

(4) Construction crew attending an orientation and practice session on application procedures of PREFORMED Spacers for bundled conductors prior to their installation on the test line. This unique spacer design prevents midspan hits or intertwining of conductors, and reduces Aeolian vibration.

PREFORMED RADIO TELEMETRY MONITORS LINE CHARACTERISTICS

(5) PREFORMED LINE PATROL (jeep-mounted) and DYNALAB on location at PENELEC. The two mobile laboratories are engaged as a team routinely investigating the effects of Aeolian vibration upon the energized 460 KV line. Both laboratories carry electronic instrumentation equipment for receiving, discriminating, and recording environmental conditions which are transmitted by radio from a PREFORMED Mark II Transmitter mounted overhead in the vicinity of the test points. The DYNALAB, equipped with elaborate instrumentation, is the "mother" lab. Its function is to make extensive study of vibration conditions at a fixed location.

(6) The maneuverable jeep-mounted PREFORMED LINE PATROL "scouts" data at remote structures, making simultaneous readings for later comparison with information accumulated by the DYNALAB. Thus, correlation of data received from various points along the line can be made, making the DYNALAB investigations more meaningful.

Write for Booklet-of-the-Month
"PLANNED LINE PROTECTION for EHV"

PREFORMED LINE PRODUCTS COMPANY

5349 St. Clair Avenue • Cleveland 3, Ohio • UTah 1-4900
600 Hansen Way • Palo Alto, California • DAvenport 4-2561

Are the appliances you want <u>most</u> in the new home you plan to buy?

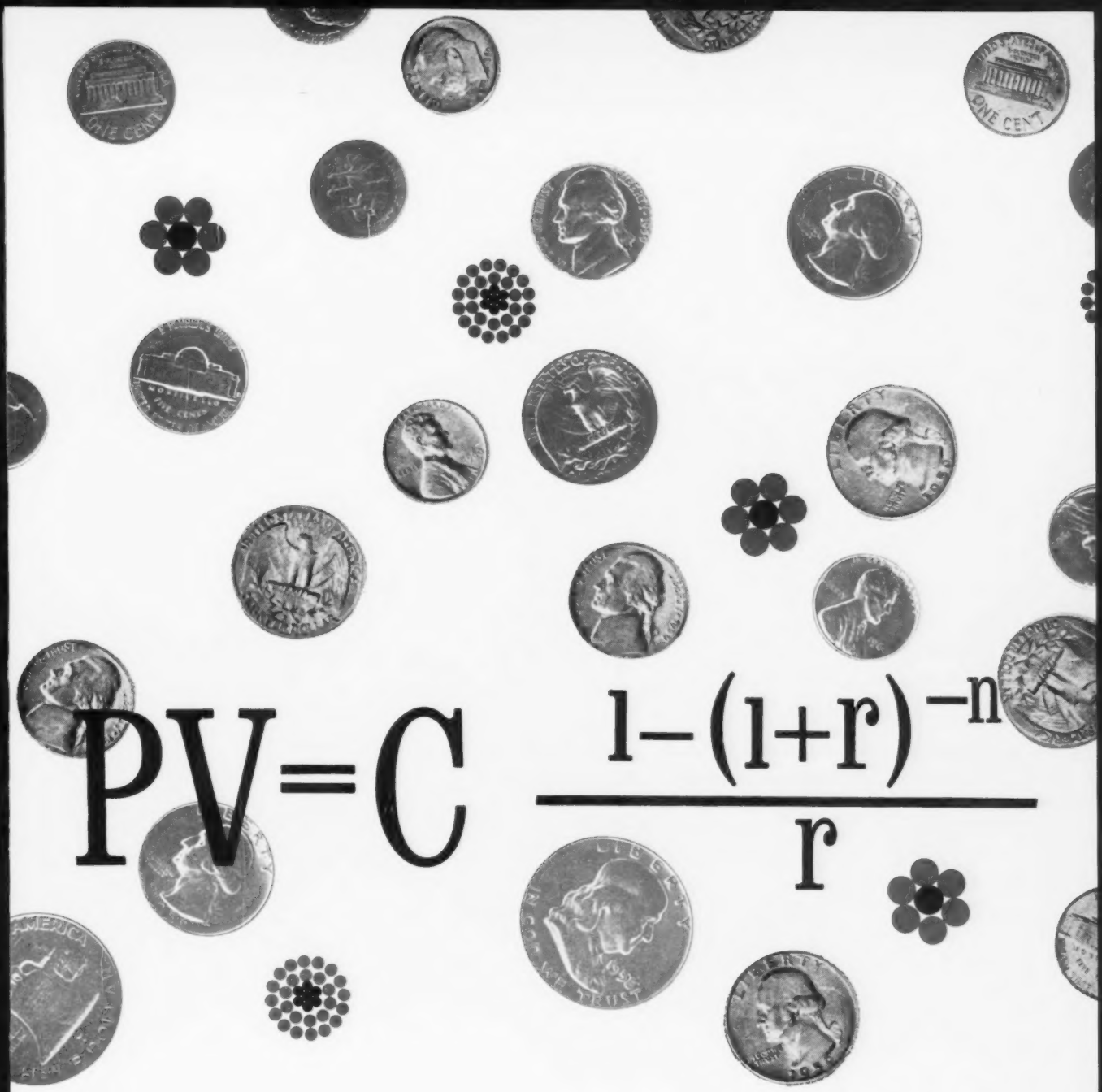
Every MEDALLION HOME has an all-electric kitchen with electric range and oven—<u>and more</u> from this list of additional appliances:

Electric DRYER
Electric WASHER
Electric DISHWASHER
Electric REFRIGERATOR
Electric WATER HEATER
Electric GARBAGE DISPOSER

The Medallion award on a new home guarantees you major electrical appliances, already installed. And you get ample wiring ... full Housepower for future needs ... *plus* lighting which is both functional and beautiful.

So look for the Medallion—national symbol of better housing and modern electric living. It identifies today's best new-home buys in every style, size, location and price range. No family should buy a home without the Medallion Home award.

SOUTHERN CALIFORNIA Edison COMPANY *helps you* LIVE BETTER—ELECTRICALLY



$$PV = C \frac{1-(1+r)^{-n}}{r}$$

How important is 1% more conductivity?

ALCOA OVERHEAD

It can save you up to $100 per mile of overhead conductor.

Compare two conductors—one with a conductivity of 61%, the other, Alcoa ACSR, with a 62% minimum guaranteed conductivity. Assume all other characteristics are equal. Now you can compute the dollar savings per conductor mile as a result of the extra 1%.

How much dollar savings? You can find the long-range answer, using the formula actuaries use to determine present value (PV) of benefits:

$$PV = C \frac{1-(1+r)^{-n}}{r}$$

where C = annual savings in dollars
n = amortization period in years
r = annual interest rate

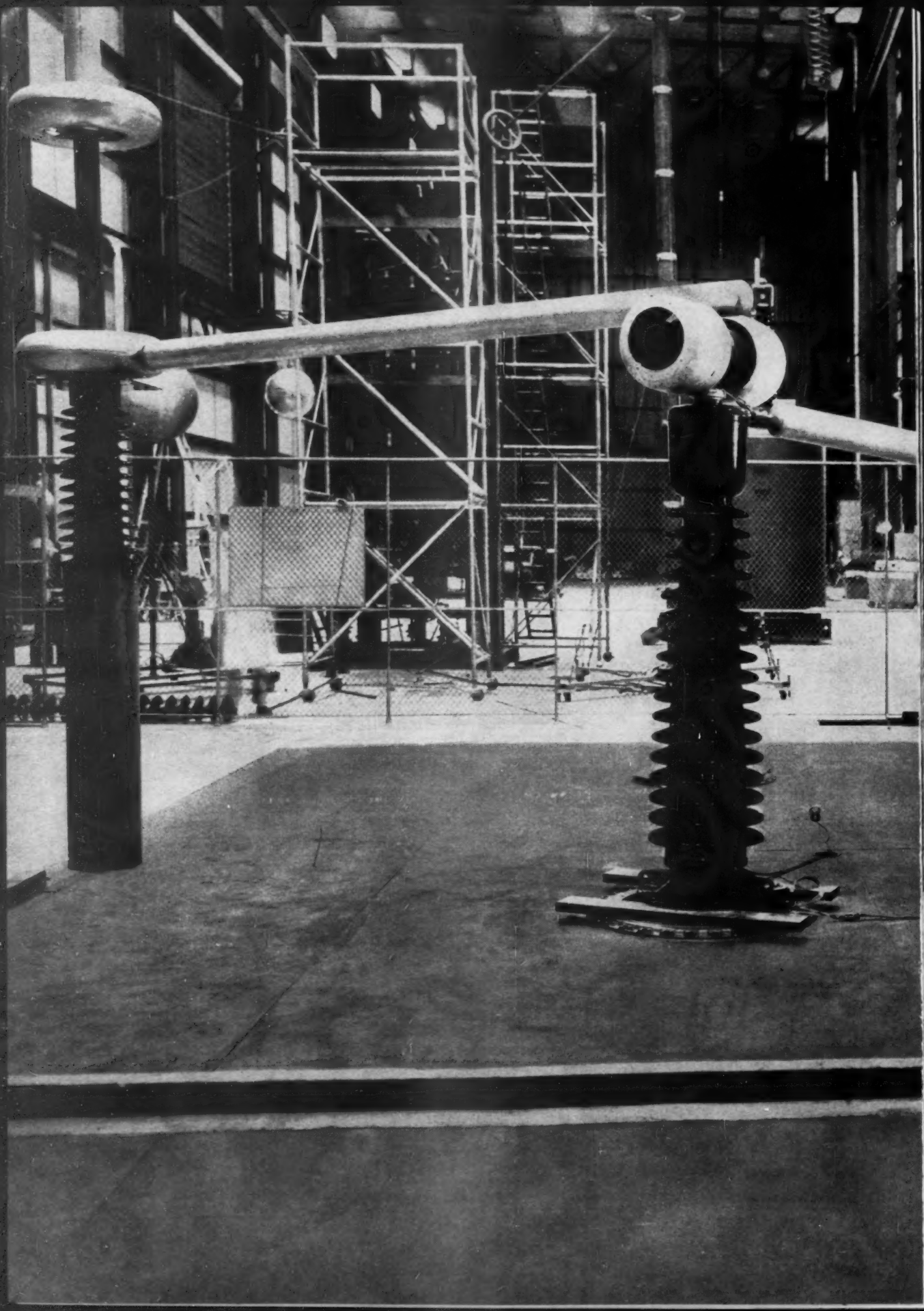
You can see how important 1% more conductivity is over the life of a conductor. If you took these savings into consideration at the time of purchase, you could actually afford to spend up to 3 cents per pound more for an overhead conductor with a guaranteed 62% conductivity.

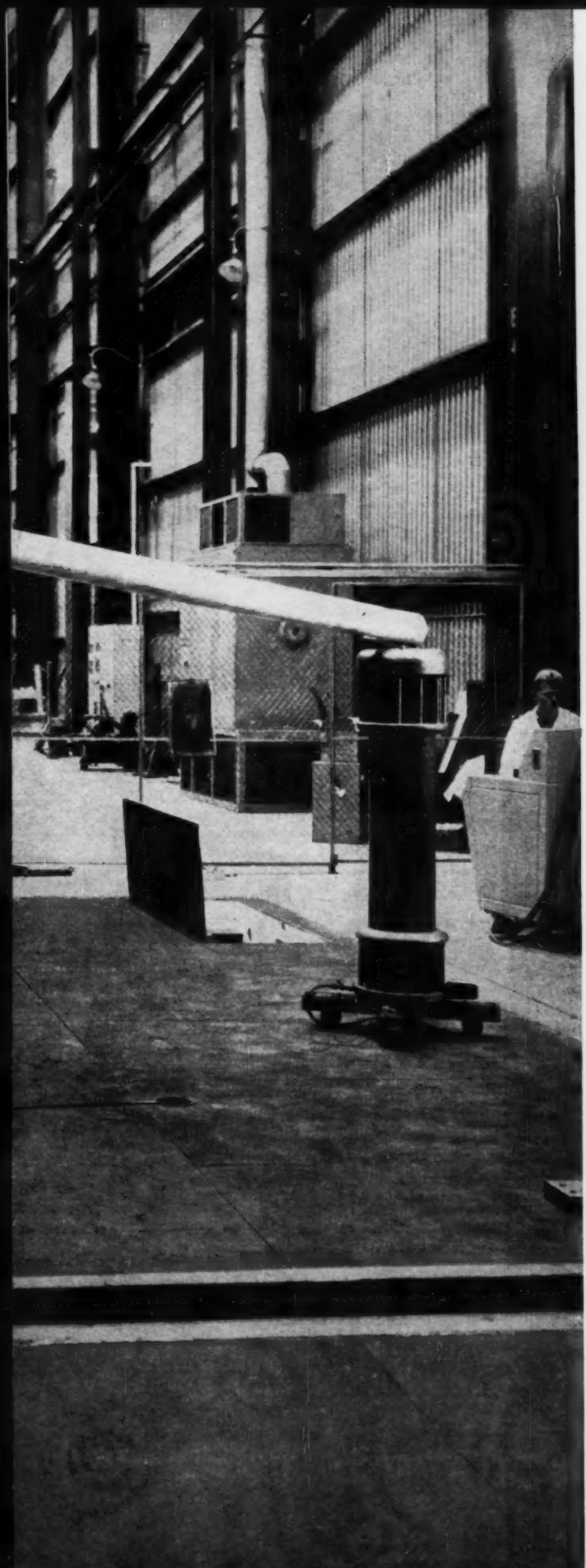
Alcoa gives you this important extra 1%—62% minimum guaranteed conductivity—at no increase in cost.

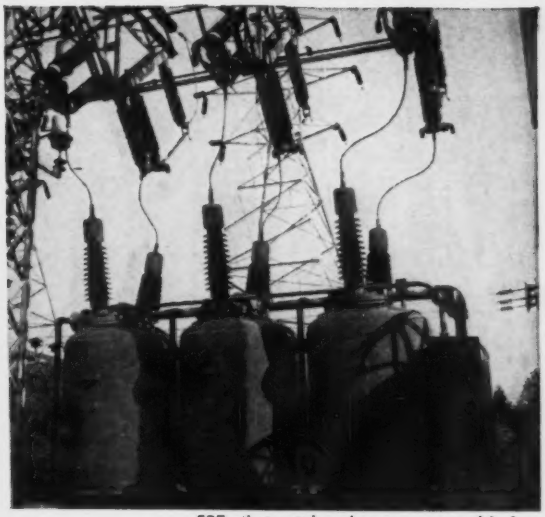
It's one of many *extras* you get when you use Alcoa ACSR and Alcoa overhead accessories.

Your nearby Alcoa-Rome salesman can help with all your overhead needs. For the name of our nearest representative, write to Rome Cable Division of Alcoa, Dept. 4-21, Rome, N. Y.

ROME CABLE
DIVISION OF **ALCOA**







FPE oil circuit breakers assure trouble-free service at Niagara-Mohawk installations.

from an 85 ft. high test tube...come breakers and bushings with longer lives!

The high-voltage laboratory of Federal Pacific, towering almost ten stories above California's Santa Clara Valley, is dedicated to making the most advanced equipment *even better.* Here we design a full range of power circuit breakers and high-voltage entrance bushings . . . produce them in a large modern facility . . . run complete tests with as much as 2,000,000 volts applied. Federal Pacific's high-voltage laboratory, the largest and most completely equipped in the West, helps produce major improvements in performance. Proof: in 40 months of rugged service at Niagara-Mohawk's Lighthouse Hill installation in upstate New York, and after 45 automatic operations under fault conditions and 23 operations under load conditions, absolutely no contact maintenance has been required on Federal Pacific's Type RHE breakers. With 50 years of leadership in circuit breaker design and construction, you can expect performance like this from Federal Pacific—superior performance from exclusive features like the rotating contact structure, the only moving part in the tank, which provides six equal breaks in series per pole. For more information on laboratory-proven, reliable, low-maintenance FPE breakers, write for Bulletin 7223, Dept. FP-8, Federal Pacific Electric Company, Newark 1, N. J.

FEDERAL PACIFIC ELECTRIC COMPANY

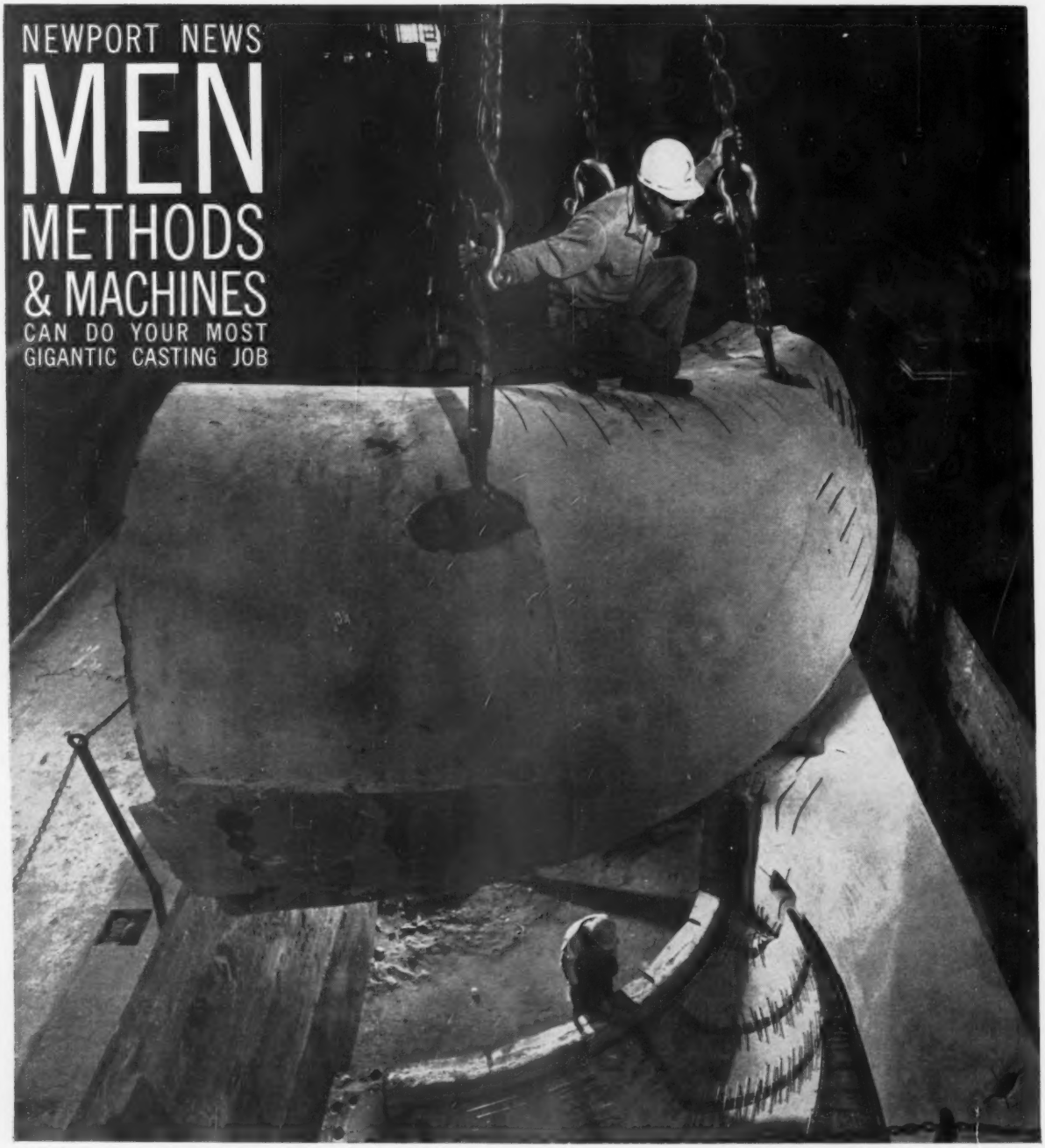
FPE

growth through creative energy

NEWPORT NEWS

MEN METHODS & MACHINES

CAN DO YOUR MOST GIGANTIC CASTING JOB



Mold for a section of a turbine stay ring for the Hartwell Power Plant. It is the largest one-piece Y-casting ever produced by Newport News.

It takes all three—men, methods and machines to tackle a job as big as this one! Newport News has completed many of them including six hydraulic turbines for the Niagara Project, four for the Hartwell Power Plant, and many others.

Newport News not only cast this giant unit but also milled it—and built the boring mill that did the work! No challenge is too great.

The secret of its leadership in the fabrication of heavy equipment is its staff of highly trained engineers and technicians, thousands of skilled workmen and 225 acre plant capable of turning out such projects as hydraulic turbines and valves, vacuum or pressure vessels for the petrochemical industry, bridge caissons, wind tunnels, and pulp and paper equipment.

Consult Newport News for preliminary recommendations at no obligation.

Newport News
SHIPBUILDING AND DRY DOCK CO.
NEWPORT NEWS, VIRGINIA

here it is! A REAL ONE-HAND TOOL

installs
INSULINK® and LINKIT®
one crimp per end!

You'll like this ONE-HAND TOOL . . . from start to finish, you can really work it with only ONE HAND. You can close it with less than a 50 lbs. squeeze; it weighs only 2½ lbs. and is only 12" long. You couldn't ask for an easier service tool . . . it's the only *real* ONE-HAND TOOL.

Position the OH25 once . . . and only once . . . on each side of the INSULINK or uninsulated LINKIT. It has a new die that crimps the entire contact area at one time. You don't have to reposition, you can't overlap crimps, and you never make less than the proper number of crimps.

And, it takes only ONE CRIMP PER END . . . a series of easy, ratchet controlled strokes to make a perfect crimp every time. The new dies cause the conductor strands to rub together, removing the oxide film for more stable, low resistance connections.

Insert stripped wire ends into INSULINK; caps grip and hold conductors.

Get up close to your work. Position ONE-HAND TOOL on INSULINK only once per crimp.

A series of easy strokes complete the crimp. Dies produce oxide-removing wiping action between conductor strands.

ANOTHER MAJOR DEVELOPMENT IN THE

BURNDY

COMPRESSION PROGRAM

40-16

NORWALK, CONNECT. BICC—BURNDY Ltd. Prescot, Lancs., England In Continental Europe: Antwerp, Belg[illegible] TORONTO, CANADA

A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SERIES

How American Industry Points The Way To Sustained Prosperity in 1961

Something new and very constructive is happening in American industry. It promises to add a major element of strength to business not only in 1961 but right along over the years ahead.

What is happening is essentially this. **American industry is planning to continue to invest heavily in new and better producing facilities in spite of the fact that it has an excess of capacity to produce its present range of products. And, by doing so, business is helping to shape a stronger American economy.** For the continuation of a high level of capital investment by business is one of the most important keys to sustained prosperity.

News of this major new development in American industry is provided by the results of the McGraw-Hill Fall Survey of Business Investment Plans for 1961 and 1962, presented in detail at the right. The McGraw-Hill investment surveys, now in their 13th year, cover a broad cross-section of American industry.

How American industry is aiming to go ahead with a big investment program in spite of its present burden of excess producing capacity is highlighted by the plans of manufacturing companies. The McGraw-Hill fall survey finds that, on the average, these companies are using slightly less than 80 per cent of their producing capacity. They would like to be using well over 90 per cent.

Dramatic New Departure

If historic investment patterns were being followed, our manufacturing companies, with only about 80 per cent of their capacity being employed, would be cutting back new investment programs drastically, and cutting down prosperity in the process. **But — and here is the dramatic new fact — they plan almost no cut-backs in their investment programs.** They plan to invest almost as much (within 3%) in 1961 as they are investing this year. And this year they are investing 19 per cent more than they did in 1959.

There are two major reasons why American industry is unwilling to let its excess producing capacity stall its investment in new facilities until the capacity is more fully used. One is that a lot of this capacity is obsolete and costly to operate. Increasingly rugged competition is creating a strong inducement to replace this antique capacity with modern, more efficient equipment which is widely available.

PLANS FOR CAPITAL SPENDING
(Billions of Dollars)

INDUSTRY	1959 Actual*	1960 Estimated*	1961 Planned	1960-1961 % Change	1962 Planned
Iron and Steel	$1.04	$1.52	$1.37	—10%	$1.18
Nonferrous Metals	.31	.34	.34	0	.32
Machinery	.91	1.15	1.11	— 3	1.11
Electrical Machinery	.52	.52	.68	+10	.63
Autos, Trucks & Parts	.64	.89	.95	+ 7	1.02
Transportation Equipment (Aircraft, Ships, R.R. Eq'pt.)	.39	.41	.37	—10	.35
Other Metalworking	.88	.97	.85	—12	.87
Chemicals	1.24	1.61	1.64	+ 2	1.59
Paper and Pulp	.63	.75	.69	— 8	.53
Rubber	.19	.24	.23	— 4	.20
Stone, Clay and Glass	.53	.63	.56	—11	.55
Petroleum & Coal Products	2.49	2.45	2.52	+ 3	2.50
Food and Beverages	.82	.94	.99	+ 5	.97
Textiles	.41	.53	.42	—21	.40
Miscellaneous Manufacturing	1.07	1.28	1.21	— 5	1.13
ALL MANUFACTURING	12.07	14.33	13.93	— 3	13.35
Mining	.99	.99	.90	— 9	.89
Railroads	.92	1.04	.79	—24	.83
Other Transportation & Communications	4.69	5.20	4.61	—11	4.18
Electric And Gas Utilities	5.67	5.89	6.14	+ 4	6.01
Commercial (1)	8.21	8.61	8.70	+ 1	8.54
ALL BUSINESS	32.55	36.06	35.07	— 3	33.80

*U.S. Department of Commerce, Securities and Exchange Commission, McGraw-Hill Department of Economics.

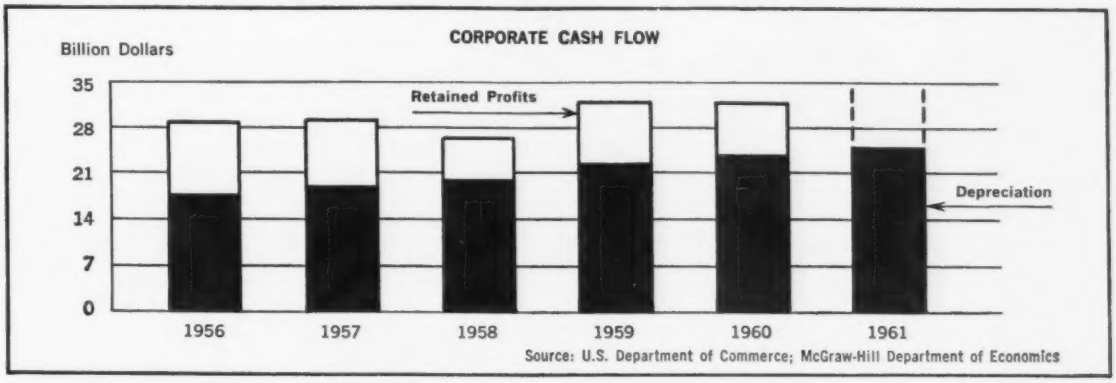
(1) Figure based on large chain, mail order and department stores, insurance companies, banks and other commercial businesses.

"R And D" Paves The Way

The steel industry provides a good case in point. Despite an operating rate of little more than 50 per cent during the last six months, steel companies plan a total investment of nearly $1.4 billion in 1961. And though this is 10 per cent below their capital expenditures in 1960, it will still be the third highest year on record.

incentive and wherewithal to continue a vigorous program of new investment. In addition, if price inflation were to begin surging again, it would eat away the power of depreciation reserves to purchase new plant and equipment.

The allowances now permitted American industrial firms for the depreciation of their producing facilities are lower than those made in any of the industrial



Also, new investment is required to tool up for the manufacture of the new products being spawned by the continuing boom in industrial research and development. This year, we are spending about $13 billion (that's *billion*) for all research and development, about $9.6 billion of it through industry.* And out of it is coming the "know-how" for a veritable flood of new products, processes and equipment, most all of these calling for new producing equipment. Next year, American manufacturers plan to get 12 per cent of their sales in products that did not even exist four years ago.

Key Role Of Depreciation Reserves

A major reason why American industry can combine the desire to carry out big new investment programs with the necessary financial capacity to do it is to be found in the growth of its reserves for depreciation. This year, (1960), business has been in a squeeze between costs and the prices it could get for its products. This cost-price squeeze has reduced profits sharply. The total of profits for the year will be down about 5 per cent.

Allowances for the depreciation of existing plant and equipment, however, have continued to rise. The result is that the so-called cash flow of corporations (their retained profits plus their allowances for depreciation) is the same this year as last. And this cash flow, shown in the chart above, makes a decisive contribution to financing new investment.

Inflation Would Be Deadly

If the sort of profit squeeze that has prevailed this year were to become chronic, it would blight both the

countries with which we are in increasingly tough competition. More adequate allowances would speed up the job of modernizing American industry. An earlier McGraw-Hill survey indicated that it would cost only slightly less than $100 billion to bring our nation's plant and equipment up to date.

But at this juncture, American industry's eagerness and capacity to maintain a high level of investment capital is adding a great new element of constructive strength to the nation's economy.

---

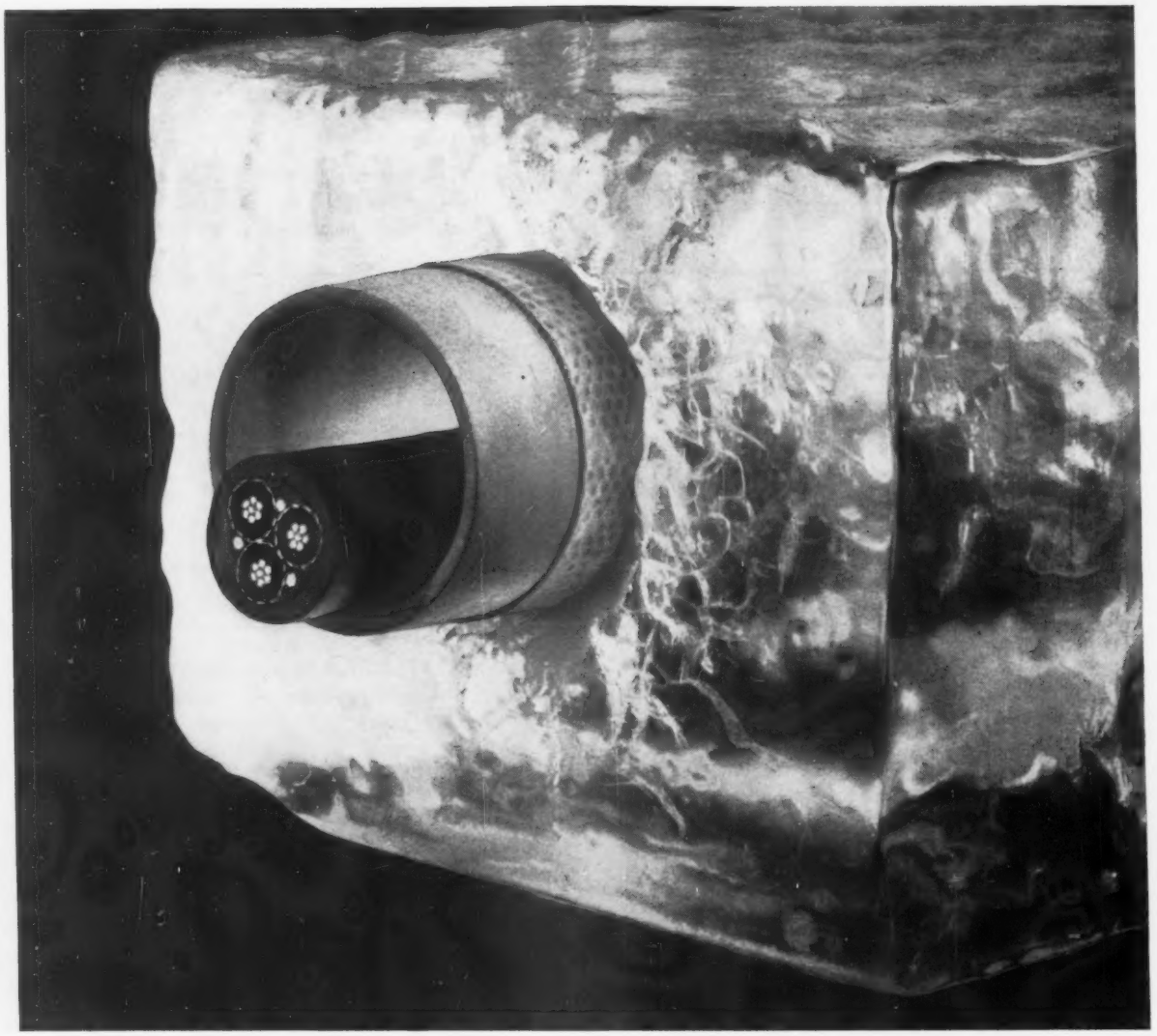
*The significance of this boom for American industry is analyzed in a new McGraw-Hill book, "The Research Revolution" by Leonard Silk, Economics Editor of BUSINESS WEEK. Together with other new business investment trends the "R & D" boom also constitutes a key part of another new McGraw-Hill book, "New Forces in American Business" by Dexter M. Keezer and associates — the November selection of the Business Book Club.

This message was prepared by my staff associates as part of our company-wide effort to report on major new developments in American business and industry. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or part of the text.

Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY

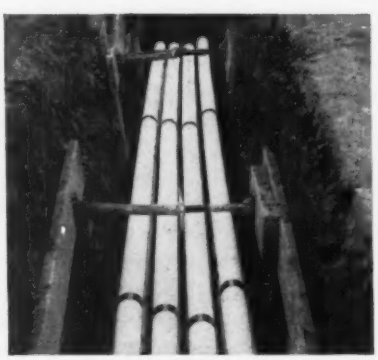


Cooler cables at lowest costs with Transite Ducts!

Do you know that electrical system losses amount to more than four hundred million dollars annually? Research shows that these losses can be drastically reduced by improving the dissipation of heat from conductors under load. The most efficient and economical way to accomplish this is with inorganic Transite® Ducts.

Tests prove that asbestos-cement Transite Ducts can actually have as much as 110.6% greater heat-carrying ability than organic ducts. This means that when a conductor is supplying a given load, its temperature will be substantially lower in Transite. These cooler cables result in lower electrical resistance with correspondingly lower I^2R losses. At a $20/KW cost, this can save you as much as $8.20 per thousand feet a year. Lower operating temperatures mean longer cable life and more reliable service, too!

Because of their 10′ lengths and speedy coupling method, Transite Ducts can be installed at the lowest cost. Get the full story by writing Johns-Manville, Box 14, EW-2, New York 16, N. Y. In Canada: Port Credit, Ontario.



JOHNS-MANVILLE

JM PRODUCTS

Meetings Calendar

FEBRUARY

21-22—*Rocky Mountain Electrical Manufacturers Representatives Club*, third Electrical Exhibit, Convention Hall, Denver-Hilton, Denver, Colo.

23-25—*British Columbia Electrical Inspectors Assn.*, annual convention, Hotel Astor, Burnaby, B. C.

MARCH

2—*San Diego Bureau of Home Appliances*, Spring Conference, Balboa Park, San Diego.

20-25—*NWPPA/OSC* Meter School, Oregon State College Campus, Corvallis, Ore.

28-30—*Electrical Maintenance Engineers Assn. of California*, 7th Electrical Maintenance Conference, Founders Hall, USC, Los Angeles.

APRIL

5- 7—*Northwest Public Power Assn.*, annual meeting, Wenatchee, Wash.

5-9—*Electrical Maintenance Engineers Assn. of Northern California, Electrical Industry* Show, San Francisco.

6-7—*Pacific Coast Electrical Assn.*, Engineering & Operating Section, Ambassador Hotel, Los Angeles.

16-18—*Rocky Mountain Electrical League*, spring conference, Harvest House, Boulder, Colo.

17-18—*PCEA*, Business Development Section, Sheraton-Palace Hotel, San Francisco.

26-28—*Northwest Electric Light & Power Assn.*, Engineering & Operation Section, Personnel & Safety Section, Purchasing & Stores Committee, Sheraton-Portland Hotel, Portland.

26-29—*National Electrical Contractors Assn.*, Tri-District meeting, Hotel Fairmont, San Francisco.

27-28—*PCEA*, Administrative Services Section, spring conference, Villa Hotel, San Mateo, Calif.

28-May 3—*San Diego Bureau of Home Appliances*, Electric Bldg., Balboa Park, San Diego.

MAY

1-2—*Illuminating Engineering Society*, Intermountain Region Conference, Hotel Utah, Salt Lake City.

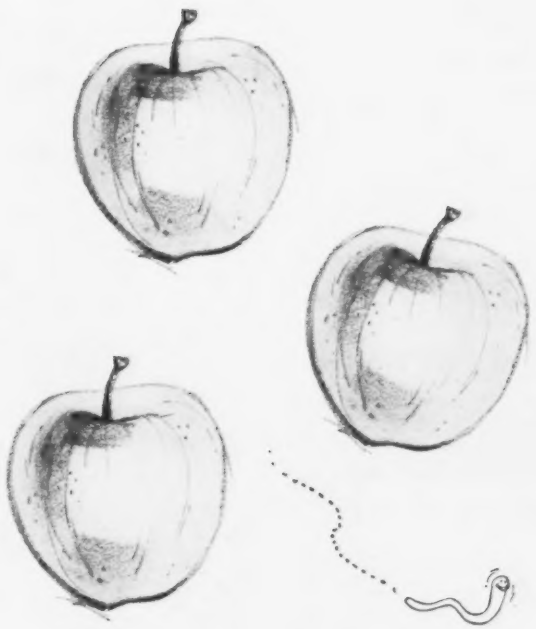
3-5—*IES*, South Pacific Coast Region conference, Sacramento Inn, Sacramento.

8-9—*IES*, Pacific Northwest Region conference, Harrison Hot Springs, Harrison, B. C.

17-19—*Pacific Coast Electrical Assn.*, annual conference, Sheraton-Palace Hotel, San Francisco.

20—*International Association of Electrical Inspectors*, three-chapter joint meeting; Northern and Central California, Sacramento Valley, Fresno, Calif.

24-26—*Northwest Electric Light & Power Assn.*, Accounting & Business Practice Section, Medford Country Club, Medford, Ore.

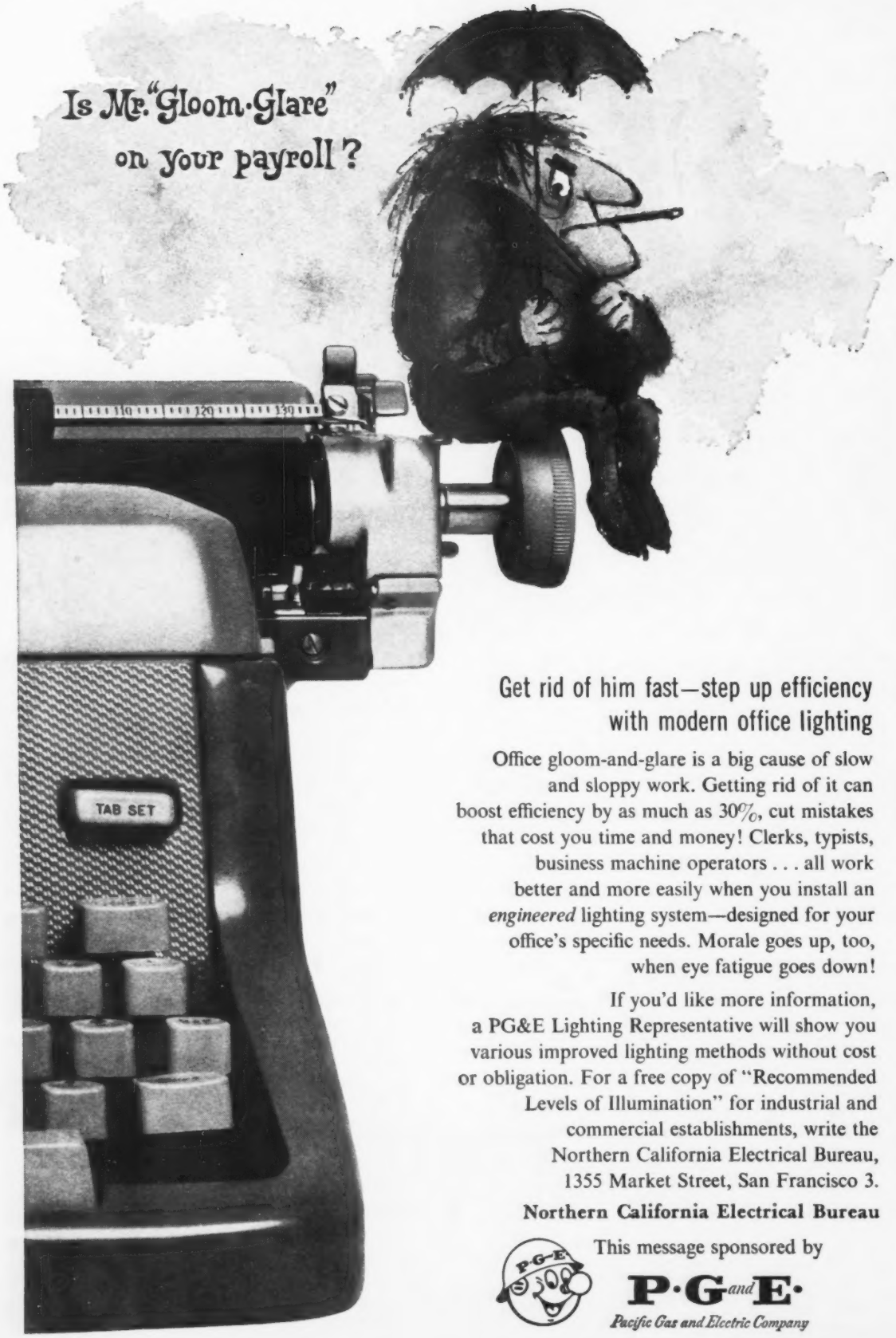


you're right:
most photocontrols do look alike

If most of today's street light controls all look like first cousins — outside, inside and sometimes even in their guarantees — how can you pick out the good ones? You could try putting them all in service, but it would be the most expensive test you ever ran. Another way is to look at *what* components are used, *how* they're used in the circuit, and what the *field experience* of other utilities has been with the control.

Asking enough questions and getting realistic answers *before* you buy 10 or 20 thousand photocontrols pays off handsomely in street lights burning when they should — and in your getting to sleep at night. Fisher-Pierce Division, Sigma Instruments, Inc., 43 Pearl Street, South Braintree 85, Mass.

FP
FISHER PIERCE
Electrical and Electronic Equipment
for Industry, Utilities and the Home



Get rid of him fast—step up efficiency with modern office lighting

Office gloom-and-glare is a big cause of slow and sloppy work. Getting rid of it can boost efficiency by as much as 30%, cut mistakes that cost you time and money! Clerks, typists, business machine operators . . . all work better and more easily when you install an *engineered* lighting system—designed for your office's specific needs. Morale goes up, too, when eye fatigue goes down!

If you'd like more information, a PG&E Lighting Representative will show you various improved lighting methods without cost or obligation. For a free copy of "Recommended Levels of Illumination" for industrial and commercial establishments, write the Northern California Electrical Bureau, 1355 Market Street, San Francisco 3.

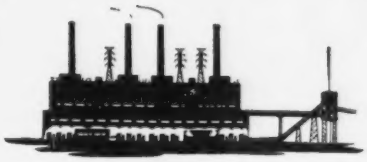
Northern California Electrical Bureau

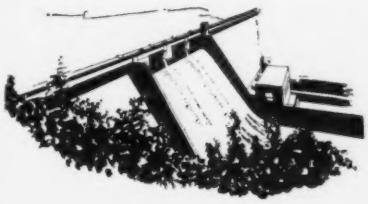
This message sponsored by

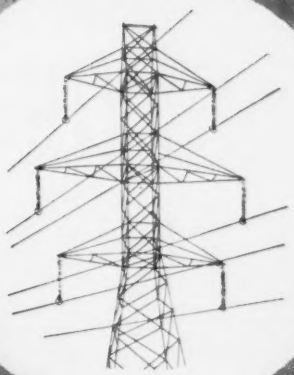
P·G and E·

Pacific Gas and Electric Company

SHORTEST DISTANCE



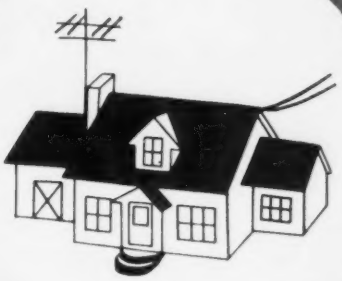


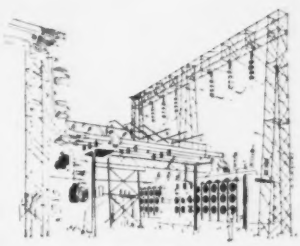


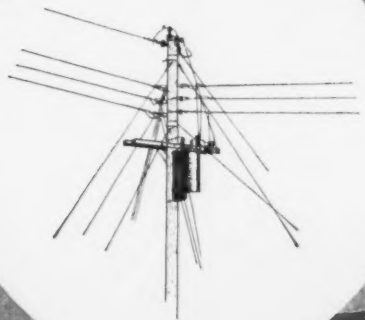
TO QUALITY AND SUPERIOR SERVICE

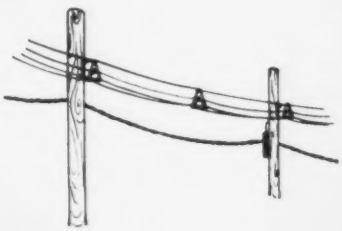
A SOUTHERN ELECTRICAL LINE

From generation — with transmission lines and distribution lines — to the service centers, SOUTHERN ELECTRICAL furnishes the finest of conductors to serve the electrical utility industry.





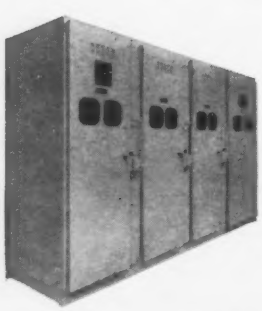




OLIN CONDUCTORS

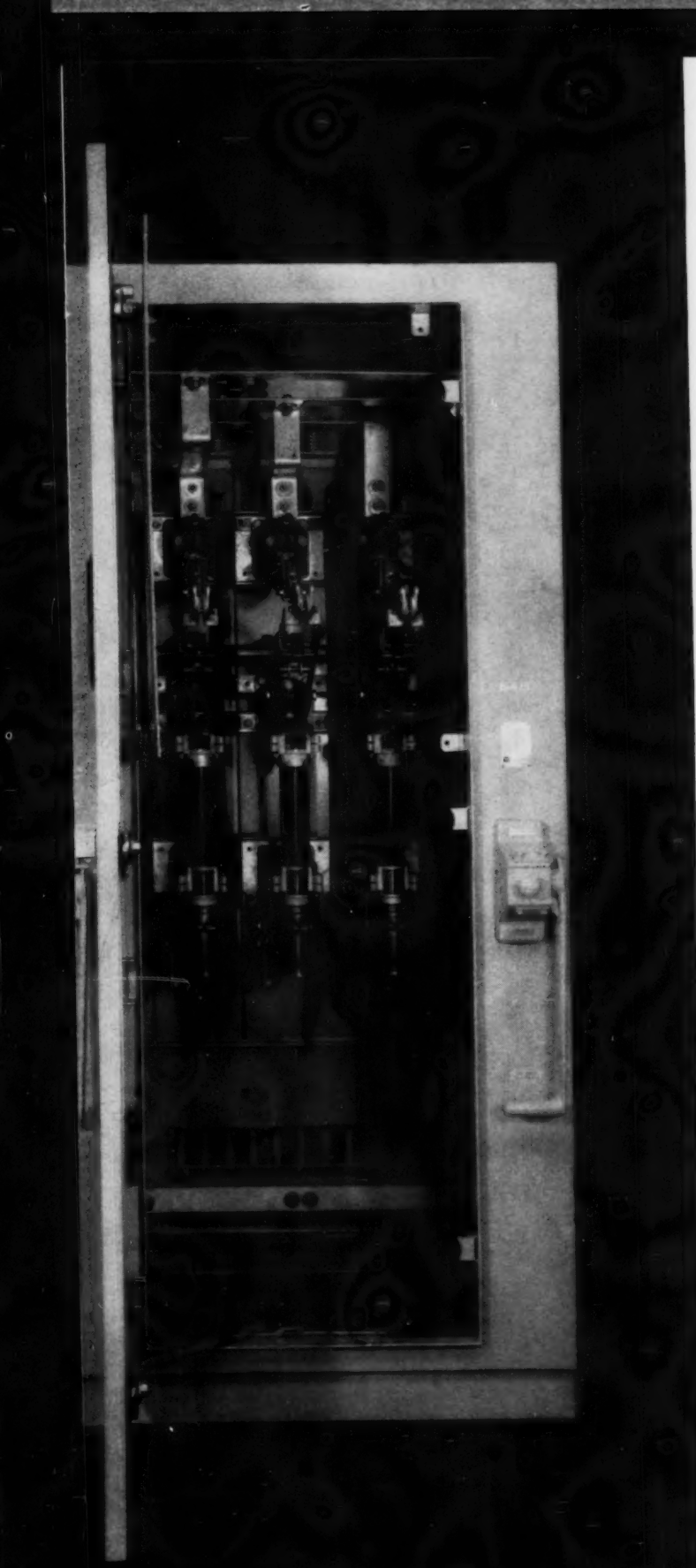
METALS DIVISION **Olin** P. O. Box 989 • Chattanooga, Tenn.

HOW SIMPLE CAN YOU GET?



S&C metalclad switchgear meets all National Electric Code requirements for fault closing, short-circuit interruption. Performance proved by high power testing at KEMA laboratories.

FUSE REFILLS



S&C metalclad switchgear is easy to operate, easy to maintain, easy to understand

The simplicity of the fused interrupters in S&C metalclad switchgear means that everyone from the consulting engineer to the electrical contractor to the plant engineer and electrician saves time, money, and effort. The power fuses give positive and permanently accurate protection against faults. The load interrupters provide full load switching and can close on any fault up to 60,000 amps (at 4.16 kv). The power fuse in series with the load interrupter takes the mystery and high cost out of high-voltage switch-gear for industrial plants and for commercial and industrial buildings.

Costing roughly half the price of comparably rated circuit-breaker equipment, S&C metalclad switchgear protects high-voltage power supply circuits with self-sufficient power fuses. Permanent faults are detected without the complicated relay systems or instrument transformers required with circuit breakers. (Transient faults do not occur on industrial or commercial power supply circuits. Thus the expensive repetitive and automatic reclosing features of circuit breakers are not needed.) After the fault has been corrected, simply replace the blown fuse with a $13.50 refill stored right in the enclosure door.

Operating instructions and installation are simple with S&C metalclad switchgear. Nothing to set, adjust, exercise or check out. Plant personnel find it easy to understand and operate.

Why not consider S&C metalclad switchgear for your high-voltage (2300 to 15,000-volt) power systems? For more information, please consult the telephone directory for your nearest S&C sales office. Or write to:

S & C ELECTRIC COMPANY

4425 Ravenswood Avenue • Chicago 40, Illinois

Specialists in High Voltage Circuit Interruption since 1911

S&C

INDUSTRY NEWS

U.S.-Canadian Pact Signed

Pact for joint development of the Columbia River Basin was signed by President Eisenhower and Prime Minister Diefenbaker of Canada. The U. S.-Canadian pact, which went to the Senate for ratification, is to run for at least 60 years.

Earlier reports from British Columbia indicated that construction was unlikely to start before the end of the year. The B.C. Energy Board had before it a big assignment to study Columbia and Peace projects, a job that is expected to require several months.

Dominion and provincial differences regarding financing of the Columbia development have been aired in B.C. A federal offer to advance $172 million of the $450 million needed was rejected by B.C. Premier Bennett in December on grounds that the Ottawa government was demanding a continuous share in profits. He said the offer would saddle B.C. with extra interest costs and would result in a new joint-super-agency set-up, charges denied by Ottawa.

More recently Bennett was quoted as insisting that Columbia power be delivered to Vancouver at the 3.77-mill figure quoted by Federal Justice Minister Fulton. He said he did not doubt Fulton's figure, he just wanted a guarantee.

Peace River Gets Go Ahead

Directors of Peace River Power Development have authorized President W. C. Mainwaring to proceed with all plans for the $630 million Peace River hydro project.

It will go ahead as scheduled regardless of outcome of the Columbia River power dispute, Mainwaring said.

Schedule calls for preliminary construction start next year and first generation of power in 1968.

► **California Electric Power Co.** has dropped electrical rates an average of 12.9% to some 2,400 residential and commercial users in the desert area in and around Palm Springs. Reason for the decrease was attributed to the population growth of a number of desert communities.

Seek Federal Aid

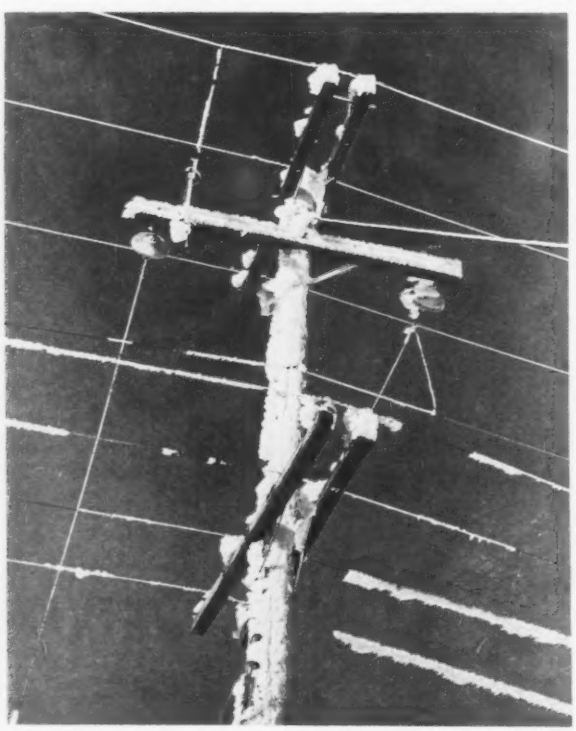
Proponents of a coal-fired steam generating plant near Cle Elum, Wash., are seeking to have the district classified as a "depressed coal area" in order to obtain federal aid.

The Kittitas Valley Development Assn. has decided to apply for the proposed aid through Senator Paul Douglas of Illinois, chairman of a coal aid committee appointed by President-elect Jack Kennedy. It will point out that mines in the area have reduced operations by 80%.

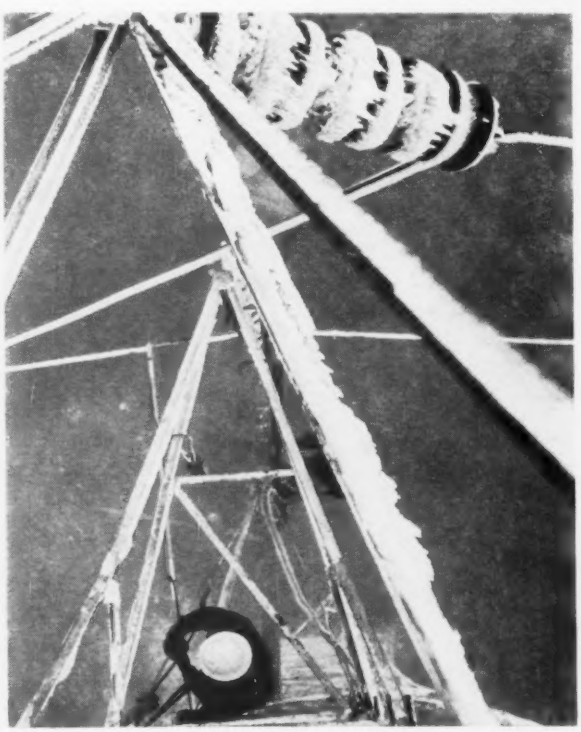
The Kittitas County PUD of Ellensburg has conducted studies for a $55 million steam generating plant whose output could be sold to firm up hydroelectric energy.

► **The California State Public Utilities Commission** has moved its Los Angeles office to the city's new state office building. The address is 107 S. Broadway, Los Angeles 12.

► **Public Service Co. of Colorado** has declared a stock dividend amounting to one share for each 20 shares of its outstanding common.



WINTER took a heavy toll in Washington Water Power territory, when freezing fog knocked out service to more than 10,000 customers. Outages lasted from a few minutes to 14 hours. Ice coating caused line breaks and damaged crossarms



ICING on Pacific Gas and Electric's Vaca-Dixon-Oleum 110-kv lines kept about 90 men busy four days and nights maintaining service. This closeup was taken from the tower. Truck and man on ground were barely visible because of dense fog

MODEL of a hydroelectric pavilion to be constructed for the Century 21 Exposition in Seattle. Joint exhibit of all electric utilities in the state, the pavilion will show the industry's future growth potential. Members of the steering committee are Al Couch, Puget Sound Power & Light; Cliff Tyler, Seattle City Light; Ken Billington, Washington State PUD Assn.

All-Federal System Pushed

Colorado River Basin Consumers Power Inc., representing REAs and municipal systems, has recommended to the Department of Interior the construction of an all-federal transmission system for power from the Upper Colorado Storage Project.

The organization is composed of rural electric cooperative systems, public and municipal power agencies in Arizona, New Mexico, Colorado, Utah and Wyoming.

Its study showed private utility transmission lines to wheel power from the project would require $492,062,000 of additional revenues over the 100-year payout period of the project. The study showed total revenue requirements of $2,326,156,000 if private lines are used compared with $1,834,094,000 if federal transmission facilities are built.

Marion M. Wilson, president of Consumers Power, wrote the department that it was his group's "unqualified recommendation that the system be an all-federal one, and that you so determine at the earliest possible date."

Indians Ask Return of Tidelands

It would cost the city of Tacoma approximately $37 million to replace the Cushman hydro installations near Hoodsport, it was pointed out in a federal district court suit brought by the Skokomish Indian Tribe, seeking a return of tidelands in the Hood Canal area.

Dean Barline, director of utilities, testified that the entire Cushman project cost some $16 million when built between 1923 and 1930. It brought in $2,255,000 in 1959 and $2,227,000 in 1958. Barline also said that the discharge from Cushman No. 2, lower of the two dams, runs across tidelands.

He told the court that the city owns considerable land south of the tailrace because it wishes to keep the area clear in event an earthquake or other catastrophe ruptures the penstock. He said the city wants to control land underneath power lines for the same reason.

Merger Proposed

Directors of Southern Colorado Power Co. and Central Electric & Gas Co. have recommended that the firms be combined under the name of Western Power & Gas Co. This consolidation proposal will be submitted to shareholders of both companies probably early in February, and must also be approved by regulatory agencies.

Central Electric, which is located in Lincoln, Neb., owns 68,329 of the 790,720 shares of common stock of Southern Colorado Power. Judson Large, president of Central Electric, is expected to become president of the merged company. Southern Colorado will operate as a division of Western Power with David B. Hyer Jr., continuing as president. Hyer and L. D. Densmore, vice president of Central Electric, are to be named executive vice presidents of the combined company.

► **Oregon's State Highway Commission** has accepted an offer by Portland General Electric Co. to provide $350,000 for relocation of the Cove Pailsades State Park. The present park site will be inundated by PGE's proposed Round Butte Dam on the Deschutes River. The utility also agreed to construct an access road to the new park site on the shore of the lake to be formed behind the dam.

NEWS INDEX

Communications	42
Manufacturers-Distributors	91
Market Development	44
Meetings Calendar	29
People	49
Washington Report	37

Acquisition Approved

The Wyoming PSC has approved Pacific Power & Light Co.'s acquisition of electric and water utilities of three southwestern Wyoming companies of $3.2 million.

Involved in the transaction were electric and water utility facilities of Southern Wyoming Utilities Co., the Union Pacific Coal Co. and Union Pacific Railroad. Southern Wyoming and the Union Pacific Coal Co. are subsidiaries of Union Pacific railroad.

Electric facilities involved in the transaction are located at Rock Springs, Green River and Hanna.

PP&L will continue the present rates and present employees will be retained by PP&L. They will be eligible for PP&L's group retirement and insurance plans.

► A new corporation, **Power & Light Exhibit Inc.,** has been formed to conduct the participation of the investor-owned electric industry in the New York 1964-65 World's Fair, according to J. E. Corette, president of the Montana Power Co. The utility is taking part in the industry's plans for the fair exhibit, which is being designed as one of the principal attractions. The electric industry will have a 44,000-sq-ft space in the exhibition building.

State Court Rules for Utility

Ruling for Public Service Co. of New Mexico, the New Mexico Supreme Court reversed a portion of a lower court decision in a Santa Fe water rights case. State Engineer Steve E. Reynolds had approved an application by the utility to drill a well and appropriate water to supplement its surface rights but imposed a 5,040 acre-ft limitation.

A utility appeal against the restriction lost in the Santa Fe District Court. The higher court ruled that Reynolds had no right to determine the utility's claimed water rights and had done so by limiting the total amount of water it could get from all sources in the area.

The litigation, involving water within the boundaries of the Rio Grande Underground Water Basin, is part of an over-all action on the application, which is opposed by the State Game & Fish Commission and 55 property owners. The high court will rule later on the opposition's appeal of a lower court decision upholding Reynolds' ruling that the company's proposed water diversion change would not impair existing rights.

REAs Ask New Legislation

Colorado REAs have asked the State Legislature to enact a new law which sponsors say would protect the public from "intermingling and unnecessary duplication of electrical distribution lines."

The proposal stems from a 1960 Colorado Supreme Court ruling curtailing operations of Union Rural Electric Assn. of Brighton, a suburb north of Denver. The order halted any further expansion of Union, an REA, and gave to Public Service Co. of Colorado and Colorado Central Power Co. exclusive rights to serve some 350 square miles of territory north and northwest of Denver.

Union appealed the decision to the U. S. Supreme Court which declined to review it.

The proposed new legislation provides:

1. No supplier of electric power may construct distribution lines within one airline mile of an existing distribution line. In cases of two or more companies already having lines within one mile of each other, the one closer to a new customer would provide service.

2. One supplier cannot replace another that is already rendering service.

3. The Colorado Public Utilities Commission shall have power to grant public utilities the right to supply electricity to all users in any given area, provided the utility was in the area prior to Oct. 1, 1960.

4. If a supplier is already serving an area, other suppliers cannot come in and compete with it.

5. Annexation of an area supplied by one electric company to a community supplied by another shall not affect either firm's right to serve their respective customers.

6. All suppliers, public and private, are subject to the jurisdiction of the Colorado PUC.

Private Power Scores

Private power scored two aces as the Washington State Legislature completed its organization for the 1961 session.

Rep. Richard J. Kink of Bellingham, a severe critic of Tacoma City Light, was appointed chairman of the House committee on public utilities, a position which previously had been ticketed for a public power supporter. Kink is unknown either as friend or foe of public power but he comes from an area served by Puget Sound Power & Light Co. and his work as a commercial fisherman has set him in opposition to development of streams for their hydroelectric resources rather than their fish. In the 1959 session, Kink introduced a bill asking for an investigation of Tacoma City Light because of its Cowlitz hydroelectric development.

Tacoma's hopes for a legislative amendment of an anti-Cowlitz initiative approved in the general election last fall were dealt a severe blow with Kink's appointment. Tacoma maintains that the initiative, which would bar all power dams on the river, does not apply to one dam it now is building and another it plans to build. However, it would like legislative action to give it clear exemption.

Private power's other victory is in the announcement that Senator Martin Durkan of Seattle, generally considered a public power advocate, will head the drive for an "anti-raiding" bill which would prohibit public power groups from taking customers in an area where a power company already has lines. Durkan said he favors the bill allowing Tacoma City Light to build on the Cowlitz and expects to support public power in virtually every other case but that he regards the anti-raiding bill as necessary protection for the consumer.

Holoboff Appointed to PUC

Frederick B. Holoboff, chief deputy city attorney in the city of San Diego, has been appointed to a six-year term on the California Public Utilities Commission to give Governor Edmund G. Brown, Democrat, control of the regulatory agency.

Brown previously had appointed Everett C. McKeage, commission president, and George G. Grover of Corona. Each of the five members of the commission receives $20,948 a year.

Holoboff has specialized in public utility and rate cases as a member of the San Diego city attorney's staff. Grover and McKeage also are attorneys. The two holdover members, Peter E. Mitchell and C. Lyn Fox, are not lawyers.

Licensing Bill Introduced

A bill has been introduced in the California Legislature to provide for the licensing and regulation of the TV, radio and home appliances repair, maintenance or servicing businesses.

The measure, AB 265, sponsored by Assemblyman William S. Grant (D) of Long Beach, would create a state board of consumer technical services to administer the law.

► **Portland General Electric Co.** has appropriated $39,573 to finance the third-year study of Pelton Dam's fish passage facilities. A total of $115,854 has been contributed so far by the utility to the field study conducted jointly by PGE's aquatic biologist, state fish and game agencies and the U. S. Fish and Wildlife Service. Research emphasis is concentrated on efficiency of Pelton's artificial outlet for downstream migrant salmon aids. The Pelton outlet is the prototype of the so-called skimmer devices.

► Los Angeles Mayor Norris Poulson reports that three **Department of Water & Power** officials are engaged almost full time in efforts to induce major business firms to establish operations in the City of Angels. The task force, which called on almost 400 concerns during 1960, is comprised of Chester Dye, Alva Hall and Carl Bennett. Dye said that the department has budgeted $100,000 for the promotion. One of the chief selling points of the campaign is that Los Angeles has spent more than $466 million in the past 7½ years in developing new water and power facilities.

► **Arizona Public Service Co.** has filed new rate schedules which would lower the cost of electric service by approximately $400,000 annually for its commercial and industrial customers in northern Arizona. John L. Liecty, treasurer, pointed out that over a period of time the increased use of electric energy will more than offset the initial revenue loss in these new developmental rate schedules.

New Type Tower Under Test

Preliminary tests are said to be proving the efficiency of a new type of high tension transmission tower in British Columbia, designed for possible use in the Columbia River hydro project.

The tower design was sponsored by the International Power & Engineering Consultants Ltd., Vancouver, B. C., and the Aluminum Co. of Canada. The latter handled fabrication at Vancouver.

The tower is designed primarily for use in rugged northern B. C. areas and can be transported by helicopter when fully assembled. It has only two legs which can be erected in a V shape or spread out. The V erection method would require only one base mounting.

Made of aluminum, the towers cost more than steel towers. However, the 100-ft-plus tower weighs only 3,800 lb, which is about one third the weight of conventional steel towers.

Tests are being carried out by International Power & Engineering Consultants Ltd.

Contractor Wins Damages

Damages of $17,500 were won by Par Electrical Contractors Inc. of Kansas City, Mo., in a suit against Public Service Co. of Colorado over construction by Par of a transmission line. Par asked for $82,000, claiming delays caused by the utility (principally in securing right-of-way) increased its expenses.

Par was given a contract by PSC in 1957 to construct a line between its Poncha substation to Southern Colorado Power Co.'s plant at Canon City, Colo.

► **Southern Nevada Power Co.** has split its common stock by the issuance of one additional share for each two shares of common held by shareholders on Jan. 5, 1961. This will increase the number of common shares outstanding from approximately 780,000 to about 1,170,000. Issuance is contingent on PSC approval.

Washington Report

Legislation Before Congress

New legislation introduced in the 87th Congress, which convened in January, shows a marked similarity with that introduced in previous years. Some of the new bills are identical with earlier measures, while others are rehashes.

Here are some of the more important ones to power systems.

Resources Council—Sen. Clair Engle (D-Calif.) has introduced a bill (S-239) to create a permanent federal "council of resources and conservation advisors," along with establishment of a national resources policy. This bill is similar to one introduced previously (S-2549) by former Sen. James Murray (D-Mont.).

Fryingpan-Arkansas — Senators Gordon Allott (R-Colo.) and John Carroll (D-Colo.) have introduced jointly a new bill (S-284) to authorize a federal transbasin irrigation and multipurpose power project across the Continental Divide in Colorado.

Capital Budgeting—Bills were introduced in the Senate (S-195) by Sen. Wayne Morse (D-Ore.) and in the House (HR-960, HR-1968) by Representatives Edith Green (D-Ore.) and Al Ullman (D-Ore.) to require the federal budget to distinguish between federal expenditures for capital investments and operating costs.

Trimble Bill—Rep. James Trimble (D-Ark.) again has introduced his long-standing bill (HR-8) to revise cost accounting procedures for federal multipurpose projects, possibly extending the amortization period for some projects to 100 years. Net effect of the measure would be to reduce power costs at federal dams.

Recreational Benefits — Sen. Robert Kerr (D-Okla.) has introduced a bill in the Senate (S-121) and Rep. Trimble has introduced an identical bill in the House (HR-1834) to require that recreational benefits at federal multipurpose projects be determined and included in the cost allocations of these projects.

Burns Creek — Similar legislation has been introduced again in the Senate (S-66) by Senators Frank Church (D-Idaho) and Henry Dworshak ((R-Idaho) and in the House (HR-36, HR-378) by Representative Gracie Pfost (D-Idaho) and Ralph Harding (D-Idaho) to authorize the federal $50 million, 90,000-kw Burns Creek power dam as part of the Palisades project on the Snake River, Idaho.

Anticipated Legislation—(1) a bill to create a federal, "valley type" power marketing agency in the Pacific Northwest, replacing Bonneville Power Administration, probably by Sen. Maurine Neuberger (D-Ore.); (2) legislation to extend federal reclamation law to all 50 states, probably by Sen. Clair Engle (D-Calif.).

New Faces of 1961

There'll be a number of new faces in Washington, D. C., heading up federal agencies involved in regulation and controlling power activities. Actually, the change-over in political administration won't produce as many as in 1952.

One of the holdovers from Presidents Eisenhower to Kennedy will be Rural Electrification Administrator David A. Hamil, a Colorado Republican, and his staff. Hamil, actually, is serving the fifth year of his 10-year term and couldn't be removed without cause.

Hamil, however, is a "political realist," and would quit, if Kennedy asked him to do so. In 1952, Eisenhower had requested and received the resignation of former REA Administrator Claude Wickard.

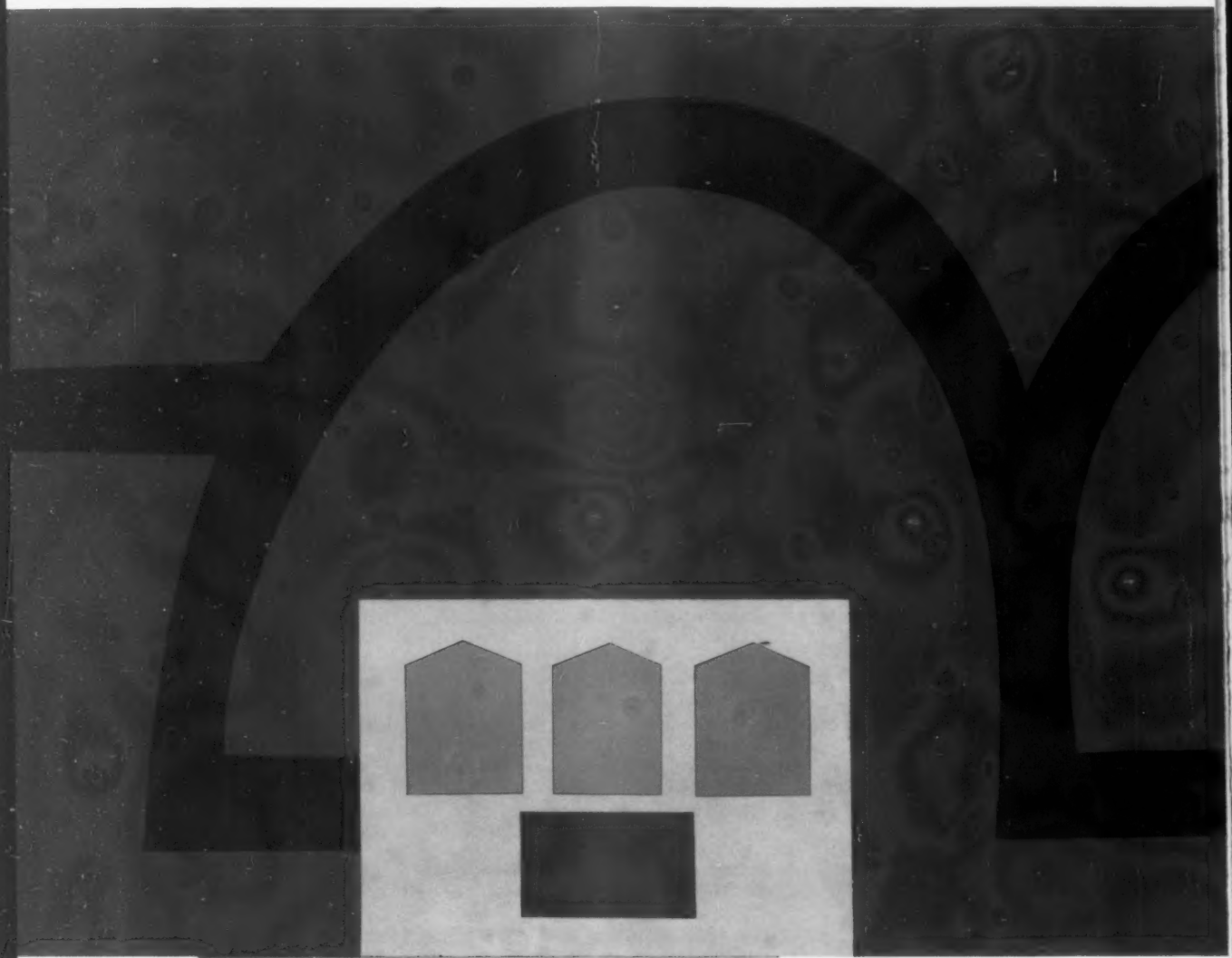
The entire team of officials in the Bureau of Reclamation, headed by Commissioner Floyd E. Dominy, will continue, principally because of Dominy's support by new Interior Secretary Udall.

Top-level changes at the Interior and Agriculture Departments, however, will play a strong hand in guiding future policy of both the REA and Reclamation. Incoming Agriculture Secretary Orville Freeman is considerably to the political left of Ezra Taft Benson, and Freeman is expected to push hard for the maximum number of loans that can be issued — and for as broad a number of projects as possible — by REA. In turn, Fred Seaton's successor as Interior secretary, Stewart Udall (D-Ariz.), portends a shift to the left in that department.

Seaton had continued, more quietly, the previous "partnership" policy established by the late Douglas McKay. Udall, however, is expected to push strongly for more public or federal power development.

Udall's under-secretary will be former California Water Commission Chairman James K. Carr; and the

Why Electro-Motive peaking



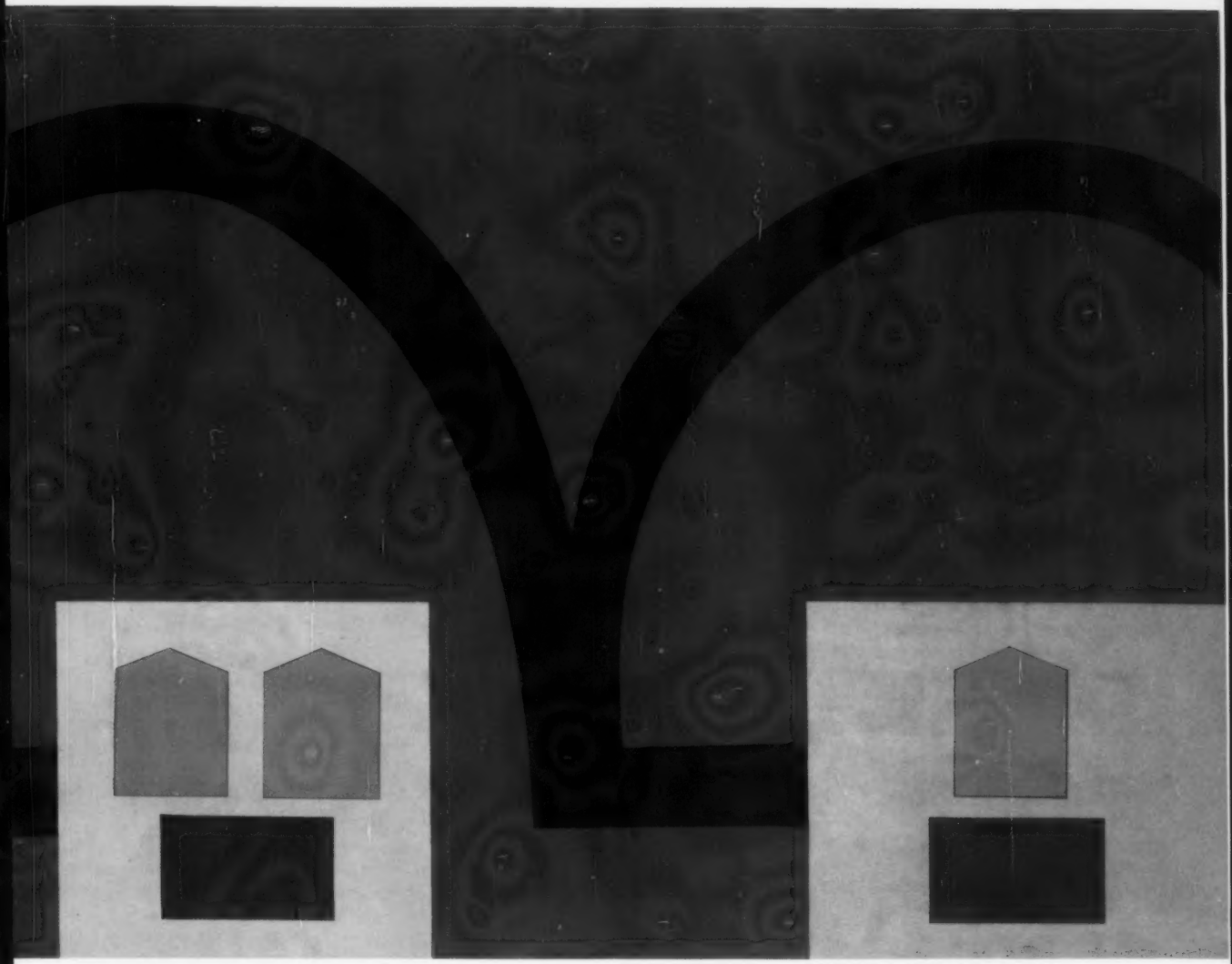
You can put

When you put the peaking power at the point of load (which can best be done with Electro-Motive Peaking Plants) you gain these five important system improvements.

REDUCED ANNUAL COSTS—You defer investment for new transmission equipment. You generate peaking power without transmission loss.

AUTOMATIC PEAKING POWER—You get automatic, unattended peaking

power makes sense



the peaking power at the point of load

power . . . practically eliminate preparation-for-peak expenses.

AREA PROTECTION—You gain automatic, unattended area protection in case of line outage.

INDEPENDENT MAINTENANCE—Your peaking and area protection generation is not affected by central station maintenance.

STANDARDIZED EQUIPMENT—You get standardized Electro-Motive equipment, completely self-housed, portable and conveniently sized to fit any location.

The logic of decentralized Electro-Motive Peaking Plants can be the answer, if you are looking for the next step in system efficiency. Electro-Motive power can mean substantial savings in many areas of your system operation. For a complete description of all the advantages of decentralized Electro-Motive Peaking Plants, contact your Electro-Motive representative.

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS
LA GRANGE, ILLINOIS

Offices: Chicago, New York, St. Louis, San Francisco • **In Canada:** General Motors Diesel Limited, London, Ontario

assistant interior secretary in charge of water and power will be former general manager Ken Holum of the Mid-West Electric Consumers Assn., Aberdeen, S. D. Holum had the strong support for this post of Alex Radin, American Public Power Assn. general manager; Clyde T. Ellis, National Rural Electric Co-op. Assn. general manager; James Patton, National Farmers Union president; and Pat Greathouse, United Auto Workers vice president. These men, along with Holum, had met with President Kennedy in December as a follow-up to their September meeting with Kennedy in Billings, Mont., at the Western States Water and Power Consumers Conference.

Kennedy will get Democratic control of the Federal Power Commission in June, when GOP Commissioner Arthur Kline's term expires. There's already one vacancy to be filled and there is one Democrat, Paul Sweeney, serving in a recess appointment. The two other commissioners, both Republicans, are Chairman Jerome K. Kuykendall and Fred Stueck.

The Securities & Exchange Commission also will switch to Democratic hands in June when the term of Republican Daniel McCauley expires. There is already an existing vacancy and one Democratic commissioner, Earl Freeman Hastings. The two remaining commissioners, both Republican, are Chairman Edward N. Gadsby and Byron D. Woodside.

A Democratic majority of the Atomic Energy Commission will occur immediately, since there are already two vacancies—including the chairmanship—to be filled, plus an existing Democratic commissioner, John Graham. The two other commissioners, both Republicans, are Loren K. Olson and R. E. Wilson.

Hearing Grinds On

The FPC hearing on the heated Nez Perce-High Mountain Sheep controversy grinds on in Washington, but the end now seems certain for some time in March. The possibility is still open that a final block of witnesses, representing fish and conservation interests, will be allowed to testify separately on the two conflicting projects in a separate hearing to be held in the Pacific Northwest—probably in Portland or Seattle.

Technical witnesses, representing various Northwestern state agencies, will follow WPPSS to the stand, and the FPC staff will follow afterward. Final portion of the hearing will be devoted to fish and conservation witnesses. Whether that portion is to be transferred to the Northwest is a point of controversy between WPPSS and PNP. The public body claims transfer of the hearings would create a "hearing of headlines," and wants it all kept in Washington. PNP, along with the FPC staff, believes a transfer would be proper.

What Happens After 50 Years?

The fate of all nonfederal hydroelectric dams—after their 50-year licenses expire—was mentioned teasingly in a year-end report by the House commerce subcommittee on legislative oversight.

The subcommittee's report referred to the fact that after 1970 large numbers of major dam licenses, issued by the Federal Power Commission, will begin to expire and, under federal statute, these dams can be: (1) relicensed by the FPC for perhaps another 50 years; (2) condemned by the federal government; (3) relicensed to other operators; (4) placed in a sort of "dam nirvana" by issuing short-term, one-year licenses to the original owners.

Actually, the House group's comments were very short and the subcommittee hasn't held hearings on the matter since 1958. The latest reference by the group to the problem is based on those previous hearings—at which no conclusion was drawn.

The subcommittee's reference to 50-year licenses is: "Section 6 of the Federal Power Act, as amended, grants the commission authority to issue licenses for hydroelectric projects for a period not exceeding 50 years. In a few years (after 1970) many of these licenses will terminate. Congress will then be faced with the problem of disposing of these projects. A federal vs private power fight of unprecedented proportions looms in the near future, and steps should be taken now to resolve some of the foreseeable problems connected with these 50-year licenses. This was the subject of recommendation in an earlier report of the subcommittee (House report 2711, pp 12-13)."

At the 1958 hearings, former FPC General Counsel Willard Gatchell questioned whether the federal government could afford to take over most of the dams because of the required payment of severance costs. The FPC has made no recommendations in any of its annual reports on the subject, including the new one released this January. The FPC feels the problem is up to Congress.

Associations

PUD Associations Meet

Load forecasts of the Bonneville Power Administration came under attack from two directions at the annual meeting of the Washington PUD Assn.

Alex Radin of Washington, D. C., general manager of the American Public Power Assn., charged the agency with "downgrading" official power-needs estimates of Army Engineers. He termed BPA's "pessimistic" position paradoxical in view of recent statements by Administrator W. A. Pearl that the agency had received inquiries for about 550,000 kw of industrial power, in addition to large blocks recently sold by BPA.

Truman Price, supervisor of the Division of Power in the Washington State Department of Conservation, questioned the "objectivity" of BPA forecasters. He pointed out that BPA, after being "quite conservative" in making its 10-year load forecasts, suddenly "became very optimistic when studying the California intertie."

Branding as "unrealistic" the composition of resources used in the intertie study, Price declared "one might suspect that BPA slanted its study to down grade the feasibility of a high-capacity California intertie which would be in competition with a low-capacity tieline BPA supported."

Gus Norwood of Vancouver, Wash., executive secretary of the Northwest Public Power Assn., forecast not only a high-capacity intertie with California but also a connecting line with the Missouri Basin, all by 1970. He predicted that a proposed new aluminum plant in Anaconda, Mont., might lead to construction of the Missouri Basin intertie before the line to California.

Labor troubles crept into the meeting through talks by W. L. Vinson and Art Kenny, business managers for IBEW locals, and in the report of the association's labor committee. The labor leaders indicated their price for all-out support of public power would be PUD abandonment of attempts at joint bargaining. Duane Vance, the association's labor consultant, later charged the Cowlitz County PUD with failure to cooperate with other PUDs in seeking joint bargaining.

William T. Elmgren of the Clark County PUD was elected president of the association, with Robert O. Keiser of the Chelan PUD as vice

president and Edward Taylor of the Mason PUD as treasurer. Taylor was named president of the Southwest Washington Assn., with Edward Evans of Clark as vice president and Ayers Perkins of Lewis as treasurer. The Eastern Washington Assn. chose Howard Cannon of the Franklin PUD as president, William Schlempp of Grant as vice president and A. L. King of Douglas as treasurer.

Association Briefs

► **San Mateo County Chapter,** National Electrical Contractors Assn., will install its newly elected officers at a dinner dance at Elks Lodge, San Mateo, Feb. 25, according to Robert G. Coleman, manager. Elected in January were: President, Ernest Canete, R. C. Electric, Redwood City; vice president, W. D. Rigler, Reco Electrical Contractors Inc., Daly City; treasurer, Stanley Fitschen, Safe Electric Co., Belmont; governor, W. H. Gillard, Gillard Electric Inc., Redwood City; directors, James Hawks, Sharp Park Electric, Norman Hughes, Richmond Electric, Burlingame; Everett L. Marshall, past president, Marshall Electric, San Carlos; Fred Spatz, Capuchino Electric, San Bruno.

► **National Association of Electrical Distributors** will hold a southern California area meeting at Town & Country Club, San Diego, Feb. 10, presided over by Ken Rehwaldt, Western Region vice president. A new field representative of NAED, Frank Blackwell, formerly of Supreme Lighting Co., will be introduced. Some manufacturer representatives will be invited to participate in panel discussions. In northern California area, Chairman John Taylor has appointed Nels Fugelsang of Sacramento as co-chairman for the Sacramento Valley area as Valley Electric, Superior Electric and Capital Electric have rejoined NAED, according to William Jewell, Western Region manager.

► **Northern California Chapter, IAEI,** elected James Graham, chief electrical inspector, city of San Francisco, as its chairman for the 1961 term at its last meeting in that city. Vice chairman is Jerry Inlow, chief inspector at alinas, Z. Roy Stanley, engineer, California State Division of Industrial Safety, was re-elected secretary-treasurer. With Graham's election San Francisco again becomes active in the inspectors' association, Robert C. Levy, chief building inspector for that city said.

Kelvin Young, standing, and Robert Wilkinson, seated, new Santa Clara-San Benito Chapter, NECA, governor and president, their wives seated beside them at inaugural

► **Santa Clara-San Benito Chapter, NECA,** installed its new officers at its annual Christmas Party Dec. 17. Kelvin Young, partner in McKinley-Young Electric Co. of Campbell, who has been president for the past two years, was advanced to chapter governor to succeed Irving Butcher of Roy Butcher Co. Richard Wilkinson of Saratoga became president. Pete Kraljev was named vice president and Joe Santora Jr. re-elected secretary-treasurer. Covering the entire state from Palo Alto to Santa Barbara, directors include Irving Butcher, James Sardella, Mike Gibboney, George Mitchell and Russ Rollins, with James Mertz for the Salinas Division, Bud Thoma, San Luis Obispo Division, and C. D. Perkins, Santa Barbara Division. George Harter is chapter manager and Neal Mangin, assistant.

► **Fred A. Waker,** Portland district manager for Crouse-Hinds Co., has been elected president of the Electric Club of Oregon for 1961. Other officers chosen are Ken B. Robinson, Westinghouse Electric Corp., first vice president; Mel H. Evans, Portland General Electric Co., second vice president; Naylor E. Cole Jr., Pacific Power & Light Co., sergeant-at-arms; Harry L. Clark, Portland General Electric Co., treasurer; Leonard Kallen, secretary; and board members, Hugh Hanna, Stubbs Electric Co., Robert Seaberg, Portland General Electric Co., Virgil Dunkin, Pacific Northwest; and Richard Keep, Portland General Electric Co.

Trade Show in San Francisco

First industry-wide electrical industrial trade show in northern California will be staged in Brooks Hall, the underground exposition hall under San Francisco's Civic Center, April 6-9. All previous conflicting elements have been resolved and the entire industry now will back the show, declared Jack J. Singleton, superintendent of the electrical department, Pacific States Steel, at Union City, president of Electrical Maintenance Engineers Assn. of Northern California, the show sponsor.

Full cooperation both of electrical contractors and union and of the southern California group, of which Singleton was once president, has been offered by EMEA of California, which has staged so many successful shows during the past 20 years on a biennial schedule. The two groups will now alternate yearly shows to avoid conflict.

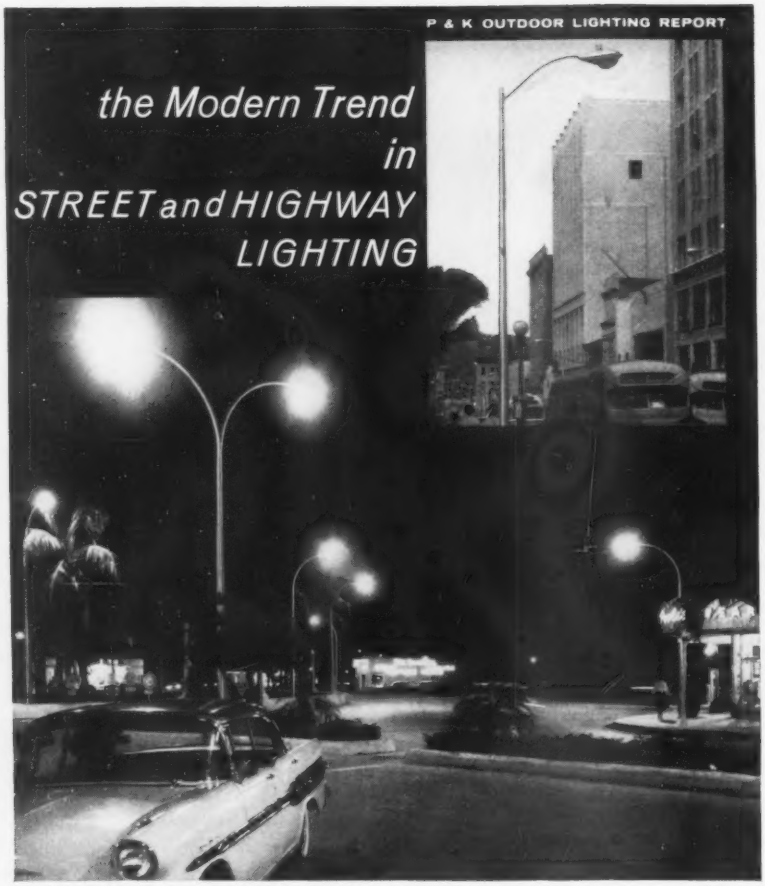
Participation by the Bay Area Labor-Management Assn. of NECA chapters and IBEW locals has also been assured.

In addition to the show, special technical and administrative conferences will be held for the expected attendance of electrical plant and maintenance engineers, consulting engineers, contractors and allied fields from southern Oregon, western Nevada and northern California.

K. B. Rymer, manager of apparatus service shops for General Electric Co. in northern California, and D. J. Miller, superintendent of shops for PG and E, Emeryville, were appointed co-chairmen for the show.

► Incoming officers of the **Electric Club of San Diego** were installed Jan. 6 at that organization's installation dinner and dance held at the Town & Country Hotel. The new slate of officers consists of Norman Ferguson, California Electric Works, president; James W. Kerr Jr., San Diego Gas & Electric Co., first vice president; Thomas Murphy, General Electric Supply, second vice president; and Thomas Melrose, secretary and treasurer. Members of the board of directors installed were LeRoy Bellwood, KFSD-TV; John P. Hardway, San Diego Gas & Electric Co.; Robert L. Cole, Westinghouse Electric Co.; Jerry Linderman, Maydwell & Hartzell; and C. J. Nevitt, San Diego Gas & Electric Co., outgoing president.

Daniel Turner, San Diego G&E, past president, served as installing officer.



TOP PHOTO: New White Way—White Plains, New York
LOWER PHOTO: Traffic circle illumination — West Miami Springs, Florida

P&K ALL ALUMINUM

LIGHTING STANDARDS & DAVITS

More than just modern-looking, P&K street lighting standards are modern in total concept. Compare our use of functional design . . . no scrolls, no tie rods . . . instead a strong aluminum tapered elliptical arm – one piece for minimum inventory, fastest assembly and installation. Compare the P&K davit, truly the ultimate in functional design with a style as fresh as tomorrow. What's more, P&K is modern in the materials of construction: to the inherent strength and light weight of aluminum, P&K has engineered designs to meet every load requirement – from the conventional incandescent and mercury vapor luminaires to the new, larger and heavier models in both mercury vapor and fluorescent. And above all, P&K is modern in its elimination of maintenance problems. No painting required – ever. Even the salty sea air offers no hazard to the good looks of P&K standards.

For more information reserve your copy of the new Aluminum Lighting Standards catalog now. Ask for our helpful brochures ALS and BR-11.

P&K

PFAFF & KENDALL 84 FOUNDRY ST., NEWARK 5, N. J.

BRANCH SALES OFFICE: SAN JOSE, CALIFORNIA
IN CANADA: POWERLITE DEVICES, LTD., TORONTO, MONTREAL, VANCOUVER

Communications

► **Wide area telephone service,** subject to approval by the FCC and other regulatory bodies, has been offered by AT&T and Bell companies. Briefly, the customer has a choice of an outgoing trunk on either a full period 24-hour basis or a metered rate based on the first 15 hours usage with additional charges for each hour or fraction over the base. Several distance zones are also available, thus enabling the customer to reduce the monthly charges by restricting the service to his optimum operating area. The service is an obvious result of the recent FCC decision to broaden private microwave eligibility requirements. It is interesting to note how easily the Bell system now finds it possible to supply services and rates that it refused even to discuss a few years ago. The FCC is to be congratulated, not only for its decision to allow private microwave expansion, but for what may have been a far-sighted needling of the Bell system, which will force it into opening its chest of wonders for better public service.

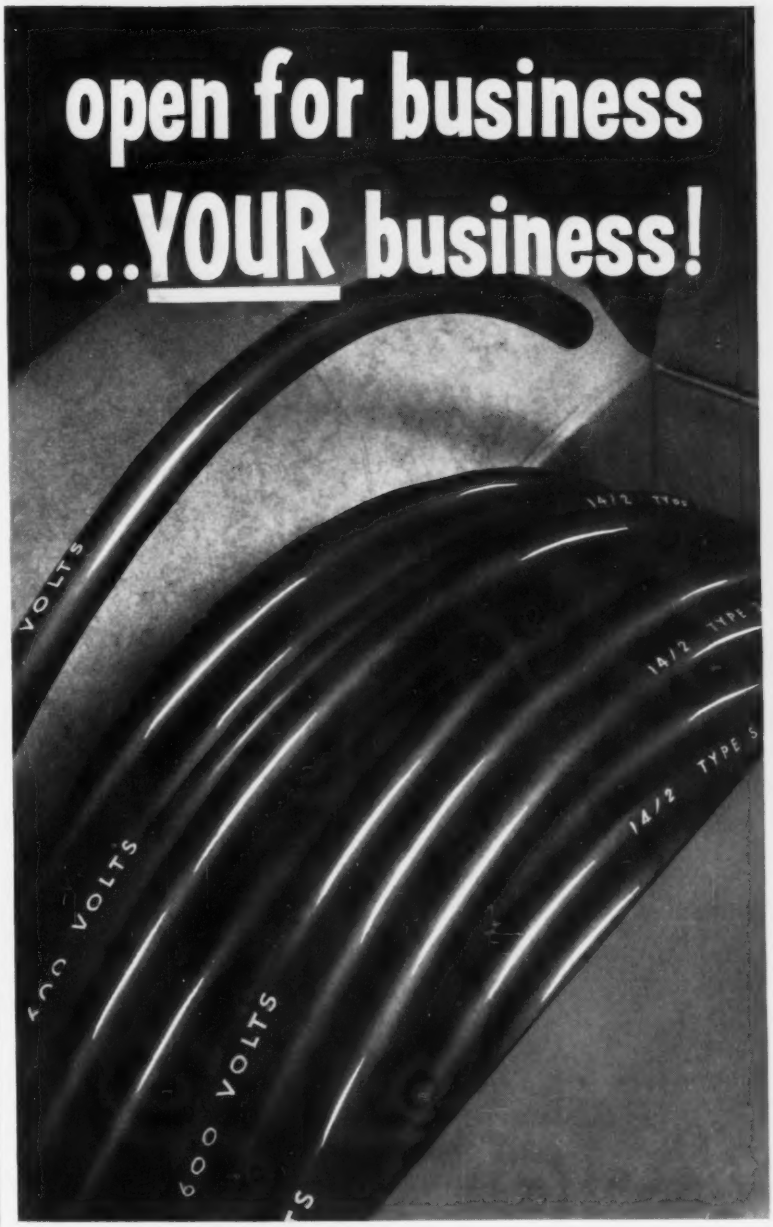
► And now, comes before the U. S. Circuit Court of Appeals, **The American Rocket Society,** with an appeal to that body to reverse the FCC microwave decision. Grasping at the dissenting opinions of some of the commissioners, the society does not request a stay in the order, but requests a complete reversal with the court being supplied with a complete record of the FCC proceedings. Main point of contention is refusal of the commission to allocate frequency band for space communications based on lack of concrete information regarding requirements. With the proceedings of the microwave docket now running to about 5,000 pages and a probable flood of new comments addressed to the court with regard to the appeal, it will be a very long proceeding if the court decides to investigate in detail. Has it occurred to you as a current or potential microwave user that such actions, if not properly contested, may place the right to use microwave in the hands of more vigorous contenders?

► **Ultraviolet light** has been harnessed to transmit wide band communications circuits, even including TV signals. Westinghouse has recently announced this development, which was primarily to supply the

military with a narrow beam width tamperproof means of transmitting information. A short time ago we mentioned a similar development using infrared light beams.' Electrical communications which started with subaudible frequencies, i.e., telegraph, have now pushed their way through the audible, a whole gambit of radio frequencies, and are now tinkering with frequencies so high that it is more convenient to treat them from the standpoint of wavelength, even if they have to be measured in terms of a small fraction of a millimeter. Future communications engineers may have to be grouped as high frequency, medium frequency or perhaps long hairs.

► **Direct dialing of base radio stations** has been accomplished by Montana Power Co. according to W. H. Blankmeyer of the company. An employee in any office having an extension of the private telephone system can, by dialing the proper number, be connected directly to any one of five base stations located along the extensive microwave system. The need for a push-to-talk button on each telephone has been eliminated by a Montana Power designed control unit at each station, which automatically keys the station on as the person speaks. Continuous energization of the transmitter for two minutes results in the operation of a timer that turns the transmitter off as a precaution against false operation. A reset occurs when the telephone circuit is released, thus preventing a continued outage if lockout was caused from a temporary condition. Dispatchers monitor all calls and can disconnect them at any time in compliance with FCC regulations.

► Apparently in keeping with its announced policy of **requiring microwave frequencies above 10 kmc** for intracity systems and, it would seem, stubs from backbone systems, the FCC has recently returned applications from a Western utility for frequency allocations in the 6,500-mc region. Backbone stations received an OK; however, at this writing it is yet uncertain as to whether the action constitutes a flat refusal to license the stubs in this band, or whether only additional information regarding interference potentialities must be supplied. If you are planning a system which will extend into urban areas, better allow plenty of time for obtaining CPs as you may have to use higher frequency gear or put up a very good story.



ROYAL Portable Cords

Open a carton of Royal portable cord and you *know* you're getting the easiest handling, fastest working cord available anywhere. Flex it, crimp it, strip it . . . and you can see why Royal cord meets *all* your job requirements for flexibility, safety, and durability. Royal's reputation for quality and dependability rate Royal Cords *first* among electrical men from coast to coast. Your wholesaler has a complete range of cord types and sizes — rubber, neoprene, plastic jackets — fixture wires, lamp cords — thermo cables, coaxial cables, bell and machine tool wires, and more. They're made right, packaged right, priced right—start to use them today!

ROYAL ELECTRIC ...an associate of

ROYAL ELECTRIC CORPORATION
PAWTUCKET, RHODE ISLAND

In Canada:
Royal Electric Company (Quebec) Ltd., Pointe Claire, Quebec

SALES REPRESENTATIVES AND WAREHOUSES: **Los Angeles**—1950 Naomi Avenue, RI 7-9655; **San Francisco**—1225 Sixth St., HE 1-5792; **Seattle**—4130 First Ave., So., MA 3-8882; **Phoenix**—221 E. Camelback, CR 7-1662 **Denver**—110 Yuma, SH 4-1351

When you select a size and grade of strand for a specific job you want to know that it meets every requirement of that job. You want ample strength to sustain the ultimate load—plus an adequate safety factor. You want pliability for ease of working in the field. You want ruggedness to withstand the abuse which may be encountered during and after installation. You want long, dependable life. And, you want reasonably low first cost and low maintenance costs.

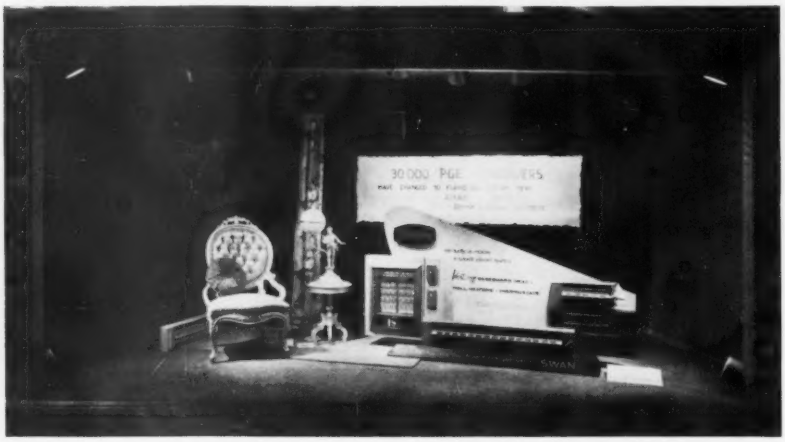
For more than 50 years *Crapo* Galvanized Steel Strand has consistently demonstrated its ability to more than meet all of these requirements. Proof of its reliable performance is to be found in the case histories of overhead power and communication lines throughout the country.

Crapo Galvanized Steel Strand is fully protected against corrosion by heavy, uniform, dense coatings of commercially pure zinc tightly bonded to the individual wires. All grades and sizes are available in A, B and C weights of coating.

For details, ask our distributor or write direct!

INDIANA
STEEL & WIRE
COMPANY, INC.
Muncie, Indiana

Market Development



This PGE window display, which made over 150,000 electric heat impressions during its eight-day run in Portland, featured Swan Vecto-ray electric baseboard and wall heaters

PGE PUSHES ELECTRIC SPACE HEATING

Backed up by market study findings and the steady increase of residential space heating load coming on its lines, Portland General Electric Co. has launched its first major effort to advertise and promote use of residential electric space heating.

The utility previously had participated in local Medallion Home programs and had sponsored "all electric" model homes in Portland home shows and other builder promotions. But it never had conducted a concentrated advertising and promotion program pushing electric space heating, as such.

Roland J. Gabel, manager promotion display for PGE, reports as follows on the factors that led to the new program.

According to the best possible estimates based on use characteristics of residential customers, PGE has about 30,000 customers who use electricity as a primary source of space heating. This number, which amounts to about a 13% saturation, had come about despite the fact that there had been no concentrated effort on the part of the company to sell electric heat through advertising media. It was estimated, too, that about one out of four of the dwelling units constructed in the company's 2,700-sq-mile service area in 1959 was heated electrically.

Another market study indicated that customer loyalty to electric heat by those who already had it was far greater than the comparable loyalty of gas and oil heat customers to the fuel they were presently using.

From these findings, it was assumed that a strong market potential for electric heat existed despite the aggressive competition of other fuels, and that the time was ripe for an active campaign.

Market studies indicated that the major selling points of electricity as a heating fuel were, in order: cleanliness, safety-health, convenience, evenness of temperature and efficiency. It was not deemed necessary to emphasize cost except to establish electric heat as competitive with other fuels and to show the foregoing advantages as plus factors. Advertisements, which ran in metropolitan and weekly newspapers throughout the company's service area, used the headline fact that 30,000 PGE customers have switched to electric heat—emphasizing the modern swing to electric heat. It also included in the copy that "one out of four homes being built in the PGE area is heated electrically." The ad concluded with the selling points determined by market studies. The tag-off pointed out that electric heat is clean . . . safe . . . comfortable.

Second objective of PGE promotional and advertising campaign was to educate builders and trade allies to the advantages of electric heat and, more specifically, to make them aware of the company's entry into active promotion. Despite the fact that electric heat was coming onto the company's lines at an accelerated rate, it was felt that the builders needed the assurance of the local utility's help and cooperation to increase consumer acceptance.

Merger of BCE Divisions

Merger of the general sales division of the B. C. Electric and the industrial development department of its affiliated Western Development & Power Ltd., Vancouver, B. C., has been announced by the B. C. Electric. The joint organization will operate as the marketing division of the B. C. Electric.

E. D. Sutcliffe, formerly general manager, Western Power Development & Power, has been named manager of the newly organized B. C. Electric department. A. E. Grauer, B. C. Electric president, stated the department would develop use of electricity and industrial gas for industry, provide market guidance to other departments of the company and handle customer relations problems.

R. G. Scott, assistant general sales manager with the B. C. Electric, becomes general sales manager for the new division. J. C. Ingram, former industrial development director, Western Development & Power Ltd., is now general development manager for the new division.

Richland Likes Electric

Electric heat is now used in 38% of the 7,011 residential and commercial customers of Richland, Wash., electric department, which completed its first year of independent operation in November.

The city took over operation from General Electric Co., which had been running the system for the AEC as community contractor. The transfer was under provisions for the incorporation of Richland, which had been operated by the federal government until 1958 as headquarters community for the AEC's Hanford Works.

Loron H. Holden, superintendent of the department, now has a staff of 25 and said that in the past 12 months service has been extended to 25 new homes in Richland.

► In another lavish unveiling, **Sues, Young & Brown** took over the Biltmore Bowl in Los Angeles recently to introduce the new Zenith, Gibson and KitchenAid lines to dealers. Food and cocktails were served continuously from 10 a.m. to 10 p.m. The distributing firm has been enjoying marked success during the past several years with its "big show" approach in introducing new lines.

► **General Electric** Co. has opened a new service center in Portland for its **houseware and radio** products. The 4,000-sq-ft leased building at 2137 E. Burnside St. is the second such center to be set up in the Northwest. James H. Martin has moved from Utica, N. Y., to head up the operation. Other centers on the West Coast are in Seattle, San Francisco and Los Angeles.

► Pan Pacific Mfg. Co., Los Angeles, has announced production of a new compact **range-oven-broiler unit.** Providing all the features of a full-size electric range, the Princess units are only 24 in. high and are particularly suitable for small apartments and motels.

HECO's Charles McAllister addresses Academy of Lighting Arts graduates at Kanraku Tea House, where diplomas and awards were presented by President Ralph Johnson. The PCEA Business Development Section in Hawaii is expanding its residential lighting program as a follow-up of the four Academy classes conducted in 1960. A Light for Living Forum composed of the 76 graduates and others interested will function under the lighting committee with Robert Linzer of Alfred E. Linzer Co. as chairman. Jim Thomas of the HECO promotional department is secretary. Plan is to hold quarterly meetings with outstanding speakers to keep members informed of new techniques and improvements in residential lighting, according to Hall Hoxie, Business Development Section chairman

Intermountain Electric Assn., Salt Lake Retail Chapter, recently completed a dealer course in business management. Six sessions, held every other Thursday evening in the Utah Power & Light auditorium at Salt Lake City, covered taxes; sales management; advertising psychology; sales budgeting and costs of doing business; finance; public and customer relations; economic forecasts. This picture was taken at the final session. Only three of those who started the course had dropped out. All who finished said they would attend future sessions on the same subjects

CENTRAL TRANSFORMER CORPORATION

REDUCES YOUR DISTRIBUTION COSTS

with its all-new, electronically designed

"7000" SERIES DISTRIBUTION TRANSFORMER

Central Transformer Corporation is proud to present its new "7000" line of distribution transformers — designed to meet the utility's growing need to reduce distribution costs.

Central's engineers, through the time-saving facility of the Electronic Digital Computer, were able to review and analyze basic design factors in literally thousands of combinations.

The most efficient combination of design factors, coupled with exhaustive research and thorough testing of every component, enabled Central's engineers to create the "7000" Series.

COORDINATED E-T-M° FACTORS MAKE THE "7000" SERIES TRANSFORMER YOUR BEST BUY!

1. REDUCED COPPER TO CORE LOSS RATIO, resulting in lower impedance, lower total losses and better regulation (especially during peak load periods), gives you LOWER OPERATING COSTS, INCREASED LOAD REVENUES and FEWER CHANGE-OUTS.
2. NEW INSULATION SYSTEM, featuring 130°C **Heavy Epoxy** insulated conductors on BOTH high and low voltage windings, gives you HIGHER LOADABILITY and LONGER TRANSFORMER LIFE.
3. IMPROVED CORE AND COIL ASSEMBLY, featuring stronger bracing, gives you INCREASED SHORT CIRCUIT STRENGTH.
4. IMPROVED MECHANICAL FEATURES, including insulated cover (15KV class), stainless steel cover clamping band and internally clamped bushings, give you LOWER MAINTENANCE COSTS and IMPROVED CONTINUITY OF SERVICE.
5. IMPROVED OVERALL DESIGN, resulting in a transformer that is smaller in size and lighter in weight, gives you LOWER INSTALLATION COSTS.

°— Electrical-Thermal-Mechanical

NEW RATINGS*

55°C.	5 Kva	10 Kva	15 Kva	25 Kva	37½ Kva	50 Kva	75 Kva	100 Kva
65°C.	5.6 Kva	11.2 Kva	16.8 Kva	28 Kva	42 Kva	56 Kva	84 Kva	112 Kva

(*shown on name plate)

CENTRAL Transformer Corporation

Sales Offices in Principal Cities

Telephone JEfferson 4-5332

PINE BLUFF, ARKANSAS

Plants at Pine Bluff, Arkansas and Arcadia, Florida

Infrared Lamps Are Answer

ROBERT G. SCOTT,
SACRAMENTO MUNICIPAL UTILITY DISTRICT

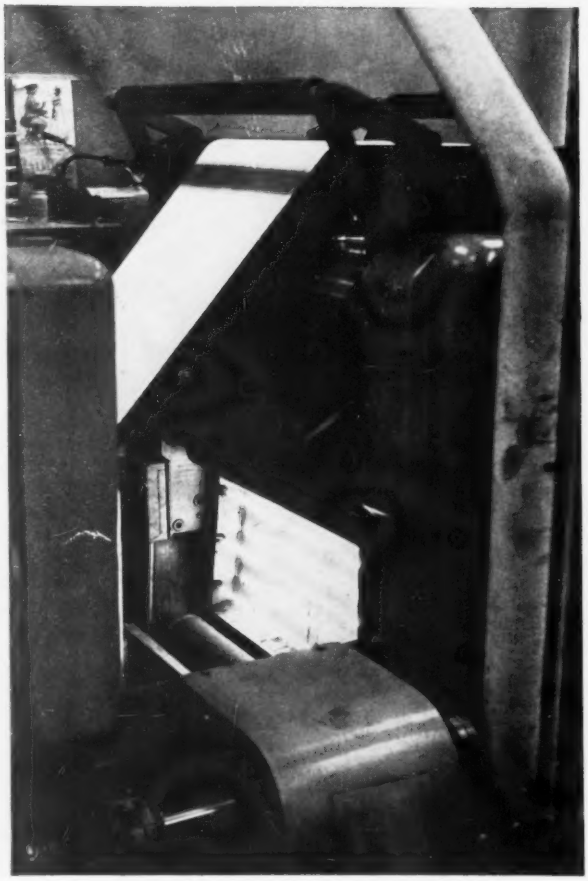
The enormous heat concentration and rapid response of the new tubular quartz, high-intensity infrared lamps have provided a practical answer to a problem encountered by Sacramento News Publishing Co.

Installed in its new plant is a continuous high-speed rotary press designed for printing business forms. These forms often include duplicates sandwiched with carbons or with carbon surfaces printed on the backs. Smudging of the paper adjacent to the carbon is a major nuisance in this type of printing, especially when handling the completed forms.

Since the carbon material consists of a mixture of finely divided graphite and wax, flash heating the carbon paper as it threads by the quartz lamps floats a microfilm of pure wax to the surface of the carbon, which eliminates the smudging.

Heat override is also no problem when quartz lamps are used. The press can be stopped for adjustments without danger of scorched material, simply by interlocking the lamp contactor with the press motor control since the lamps lose 80% of their heat within two seconds after being turned off. Three 2,500-w, 480-v quartz lamps are used, backed by an aluminum reflector. A panel-mounted variable autotransformer provides the right heat intensity to match the speed of the press.

Under consideration is an additional quartz lamp to keep the surface of the internally heated carbon-printing roller warm in the presence of cold drafts, encountered during certain times of the year.



► **A cooking show** that demonstrated uses of electric cooking appliances drew an attendance of 2,000 at Kennewick, Wash., recently. Among the sponsors were Benton County and Franklin County PUDs, Richland City Electric Department. The event had been promoted in ads over a two-week period before the show and there was a standing room only crowd for the show at the Kennewick high school auditorium. More than 500 were turned away at the doors when the auditorium was filled.

► **Electrical Distributing Inc.** of Portland has been appointed a distributor for **Fedders Corp.,** Refrigeration Appliances Division. Headed by **A. M. Cronin III,** Electrical Distributing is located at 140 N. W. 14th St.

► **California Electric Service Stations** have added two more shops to their state-wide chain of appliance service and repair stations. A new shop was opened in San Bernardino at 697 West 2nd St. This company has also bought the parts stock of Dial Electric Co. in Sacramento at 1415 21st St. and will temporarily operate the service business from that address until a new location is found. This brings to a total of 11 the number of service stations owned by the Chamblins.

► **Electrical Distributing Inc.,** 140 N. W. 14th St., Portland, has been appointed distributor for the **Fedders** Corp., Refrigeration Appliances Division.

► **The West Wind Corp.,** which pioneered the kitchen fan in Seattle more than 35 years ago, has been sold to **West Wind Mfg. Co.** The West Wind Corp. was for many years the only manufacturer of fractional motors in the Northwest. New products recently developed include automatic humidity controlled fans, which have been approved for use in the Medallion All-Electric homes. President **Claire I. Hull** states that reorganization will enable expansion into the rapidly growing field of air filtration, cleaning and purifications. Pilot models of filtering and purification equipment are being tested and are expected to be in production in the near future. The expansion has necessitated larger quarters and the plant operations are being moved from 1800 Airport Way to 111 S. Alaskan Way. Other officers of the West Wind Mfg. Corp. are **W. F. Bush,** vice president, **Neil Brislawn,** secretary, and **Robert Pelton,** treasurer.

► **Frigidaire** has opened a new headquarters in Phoenix, Ariz., with **John W. Stephens** as sales manager. Stephens moves to Phoenix from the Chicago branch.

► **Ward Terry** and Co., distributor for RCA Whirlpool appliances in the Denver area, will take on the laundry appliance franchise recently given up by **Western Appliance** Corp.

► **Westward** Inc. has been formed in Salt Lake to distribute **Admiral's** products. President is **Walter J. Michelsen,** former vice president and sales manager of General Appliance Co. Vice president is **B. L. "Brick" Wood,** Salt Lake businessman.

Ideas for Living

A package of kitchen planning and home decorating ideas was presented in San Francisco's auditorium as a part of the 1961 General Motors Motorama. The five-room Ideas for Living Exhibit utilized products and materials available today; gave homemakers many a hint for building or modernizing. In addition there were three separate kitchens, giving a total of 12 home-type areas open for inspection.

In a press preview Herman F. Lehman, GM vice president and Frigidaire general manager, said that many design features, previously included in top models only, had been extended throughout the 1961 appliance line.

Describing 1960 as a better than average year for the appliance industry, he said that he saw no reason why the trend should not continue through 1961, with possible improvement in the last half.

Californians, he said, purchased about 25% more major appliances per capita last year than the rest of the nation. On a per-million population basis, the industry sold 4,100 dishwashers in California compared with 2,400 in the nation. As for ranges, four built-ins are sold for every two conventional units in California as compared with a national average of one built-in for every two free-standing units.

All-electric kitchen, feature of Frigidaire's five-room collection of Ideas for Living shown during the GM Motorama in San Francisco last month. A few of the many conveniences are an "about face" pantry that pivots out of the wall, storage shelves that move up and down electrically; homemaker's desk with built-in intercom, hands-free telephone

Medallion Trade Show

Some 700 members of Seattle's homebuilding industry were guests of General Electric at a four-day Medallion Homes trade show, in a pioneer promotional approach.

Attendance was by invitation, extended through the mail to builders, architects, electrical contractors, real estate company representatives and others associated with the industry. The invitation specified the day and a time period for attendance, according to Van Christman, contract sales manager for G-E's major appliance division at Seattle, who arranged the affair.

The display, introduction of G-E's Residential Market Development Operation, offered the latest built-in appliances, electrical heating equipment, wiring devices, furnaces; residential and outdoor lighting fixtures, meters and entrance equipment; circuitry equipment and panels, Textolite, pad-mount transformers for underground wiring systems and promotional aids for Gold and Bronze Medallion Homes.

PCEA's Business Development Section in Hawaii shown at luncheon during a two-day meeting in Kauai. At the head table are: K. Kimura, Hilo Electric; Carl Schiffers, HECO administrative vice president; Frank Falge, PCEA Business Development chairman, San Francisco, guest speaker; William Blackfield, secretary, NAHB; Hall Hoxie, manager of Ramsay and chairman of the Business Development Section, PCEA, Hawaii; Joe Orrick, president, Kauai Electric; Robert Kuniyuki, Veteran's Electric; Fred Ward, Maui Electric

Each person registered as he arrived, and this registration card provided a handy follow-up reference.

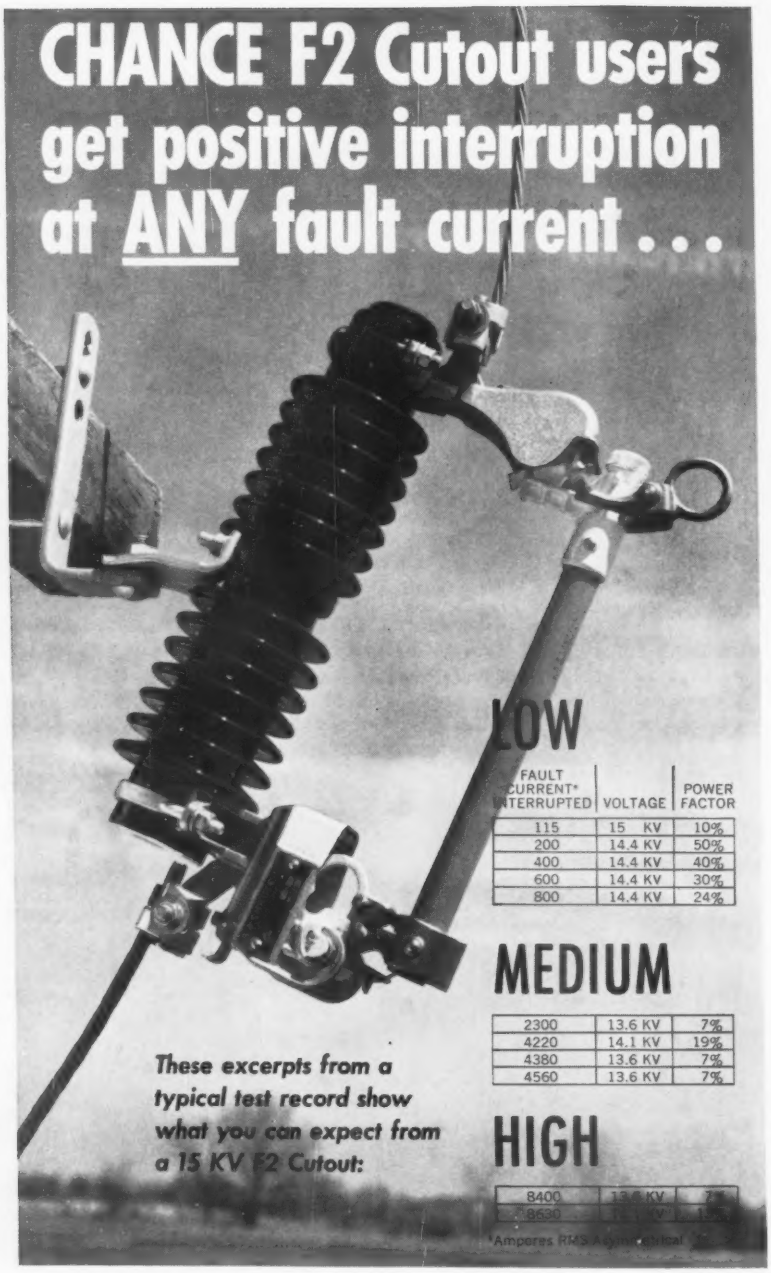
F. H. Falge, Western regional manager for RMDO, attended the show with the view of installing the pilot program in other markets of the West. Cost ran about $3,000, Christman said.

Lights On

Under the encouragement of the Chamber of Commerce, many of Seattle's downtown stores are leaving their window lights on until 1 a.m.

The executive committee of the Chamber's Retail Trade Bureau recommended that all bureau members

CHANCE F2 Cutout users get positive interruption at ANY fault current . . .



Utilities from coast-to-coast, impressed with the ruggedness and full range effectiveness of the Chance F2 Cutout, have written it into their standards. These utilities are sold on the F2's ability to protect their systems from *any* fault—HIGH, MEDIUM, or LOW (and points between) without damaging shock to procelain or fuse tubes. The F2 expandable cap and link ejector make this possible.

Chance F2 Cutouts, in voltages of 5.2, 7.8, 15 and 27 KV, and in 100 and 200 ampere ratings with interrupting capacities up to 12,000 amps, are available from local stocks. *They are also available in combination with lightning arrestors.*

A. B. CHANCE COMPANY, Centralia, Mo.
A. B. Chance Company of Canada, Ltd., Toronto CK60-20

leave their window lights on until that hour, not just for the holiday season but throughout the year. Not only does the brilliance of light show off the stores' wares, pointed out Bureau Manager Edward N. Phelan, but the light also can act as a deterrent to crime.

Phelan obtained figures from Seattle City Light that the average cost of lighting a window with 10 100-w lamps or two 500-w lamps does not exceed 1½¢ an hour.

Prospects Bright in Northern California

Trend of economic conditions and a broad summary of sales opportunities are presented in Pacific Gas and Electric's 1961 Market Outlook, a handsome 44-page appraisal prepared by the company's market research department.

Commenting on the forecast, O. R. Doerr, vice president in charge of sales, said that total business volume in northern and central California areas served by the utility should advance moderately above 1960, a year of solid growth that produced new levels of employment, income and retail sales.

According to the estimates, in the coming 12 months population is expected to grow by 3.5% to a total of 7,775,000; residential construction will continue active, with an expected total of 86,500 new homes and apartment units.

Manufacturing employment in five northern California metropolitan areas is expected to increase 5%, continuing the average rate of growth for 1955-1960. Personal income should reach another record level with an estimated gain of 5.5%. Retail sales of taxable items, up an estimated 6%, should reach a new high of $11 billion in the 47-county area.

Sales of more than one million major appliances will be the company's objective in an intensive advertising and promotion drive.

Industry will continue its substantial growth, with an average of one new plant and three expansions to be completed for every calendar day during 1961, it it estimated.

In agriculture the trend toward mechanical harvesting of orchard and field crops will increase the economy of farm operations, it is believed. PG and E's advisory services to farmers will aid in this development with special attention in 1961 to the developing technique of reusing irrigation water by means of pumping systems. Sprinkler irrigation also is expected to increase.

People

► **J. F. Emery** has been promoted to vice president and assistant general manager of Idaho Power Co. Vice president for engineering since 1959, Emery will assume over-all responsibility for electrical operations, engineering and construction. He went to work for Idaho Power while still a student at Twin Falls High School and joined the company on a full-time basis as a distribution inspector at Boise in 1928.

Emery

► **Earl A. Hanson** has been made manager of the Southern Utah division, California-Pacific Utilities Co., at Cedar City, Utah. He succeeds **Ralph R. Thomas** who retires after 50 years in the industry. Thomas went to Cedar City in 1947 as vice president and general manager of Southern Utah Power Co., which subsequently was acquired by California-Pacific Utilities. Hanson, a veteran of 25 years in the utility business, was manager of California-Pacific Utilities Co.'s Lassen division.

► **Fritz Cochrane** of Idaho Power Co. has been ordained to the Episcopal Diaconate following two years of study. His assignments will be on a nonparochial basis so that he can continue as advertising assistant for the utility. Cochrane has served for several years as a lay reader and in 1956 was cited by the Divinity School of the Pacific at Berkeley as one of the outstanding laymen in the eighth province of the church. He has been with Idaho Power for five years and has been active in NEL-PA. He is presently chairman of the association's public relations and advertising committee.

► More than 700 civic and business leaders turned out to a luncheon honoring **William S. Peterson,** who retired Dec. 31 as general manager and chief engineer of the Los Angeles **Department of Water & Power.** Peterson, who joined the department in 1922 as an electrical draftsman, reached the compulsory retirement age of 65. Moller cited Peterson's contribution in designing and constructing the 287,000-v transmission lines that first brought Hoover Dam power to Los Angeles.

Management Tests Now Show That *Truco* Turret Derrick Cuts Manpower Costs in HALF!

Shown above is a three-stage Truco Turret Derrick with a special 4′ x 6′ aluminum platform recently purchased by an electrical contractor in the western mountain states. With this single unit, this contractor set a series of 90′ poles — each weighing 5,000 pounds including the crossarms, insulators, and all pole hardware in place. After poles were set, placed and tamped, a three man crew (two on spacious platform, one on ground) clipped in the high tension conductors. Not one single lineman climbed a pole during the entire project.

By using one truck mounted combination Truco Turret Derrick and a 3-man crew, this contractor replaced 6 men, 2 vehicles and 4 arm ladders — and did the job safer, faster and surer at a cost savings of more than 50%! This Truco utility derrick tool paid for itself on the first few jobs.

INVESTIGATE the savings *you* can make on *your* aerial jobs — in dollars, manpower and time. See your Truco dealer or write for details.

TRUCK EQUIPMENT COMPANY

"The COMPLETE Line of Utility Equipment"

3963 Walnut Street / AC 2-7905 / Denver 5, Colorado

Carr

Californian Named To Interior

When James K. Carr was told early one morning last month that he was the choice for Under-Secretary of the Interior, he could hardly have been surprised. The appointment had been expected but the new Secretary of the Interior, Stewart Udall of Arizona, wanted to line up assistant secretaries before the announcement was made.

While they did not object to Carr, Upper Colorado River states wanted to be sure that all top interior jobs did not go to lower states, with whom they have differences over water uses.

Kennedy made a package announcement including Carr; John A. Carver Jr., administrative assistant to Idaho's Senator Frank Church, as assistant secretary for land resources; Kenneth Holum of Groton, S. D., a farm leader, as assistant secretary for water and power; Frank Barry of Tucson, Ariz., a lawyer, as solicitor; and Floyd E. Dominy, reclamation bureau of chief in the Eisenhower administration, as reclamation commissioner.

Carr, who is 47 years old, has been chairman of the California Water Commission since July 1959. As assistant general manager of the Sacramento Municipal Utility District, he has been responsible for the utility's public and governmental relations, certain future wholesale power supply problems and other special assignments. He was responsible for planning activities in connection with SMUD's $110 million Upper American River hydro project.

A native of Redding, Calif., he began his career in the Interior department as a rodman with a geological survey crew in the summer of 1933 while he was studying civil engineering at the University of Santa Clara. After graduation he was for 15 years associated with the Central Valley project in engineering and administrative capacities. Before going with SMUD in 1953, he served nearly three years as engineering consultant to the Committee on Interior and Insular Affairs of the House of Representatives in Washington, D. C. He was engineer-consultant to the committee when Clair Engle, now United States senator from California, was chairman.

Grauer

Appointments at B. C. Electric

Four senior appointments in B. C. Electric Co. and in its parent company, B. C. Power Corp., have been announced by **A. E. Grauer,** who will continue as chief executive officer and will hold the title of board chairman. Grauer will remain the chief policy making officer and will exercise general control over the B. C. Electric group of companies including Western Development & Power Ltd.

Harry L. Purdy, who has been executive vice president, succeeds Grauer as president and will be directly responsible for BCE operations.

A. Bruce Robertson Q. C., who has been BCE vice president and general council, becomes a senior vice president. He will be directly responsible for new developments and will undertake special assignments for the chairman.

John J. Carson, vice president in charge of industrial relations, has been made vice president and assistant to the president. **C. Roy Brookbank** succeeds Carson as director of the industrial relations division.

► **Ralph B. Johnson,** president of Hawaiian Electric Co., has been elected a member of the National Industrial Conference board for a one-year term. He also was installed recently as president of the Honolulu Chamber of Commerce.

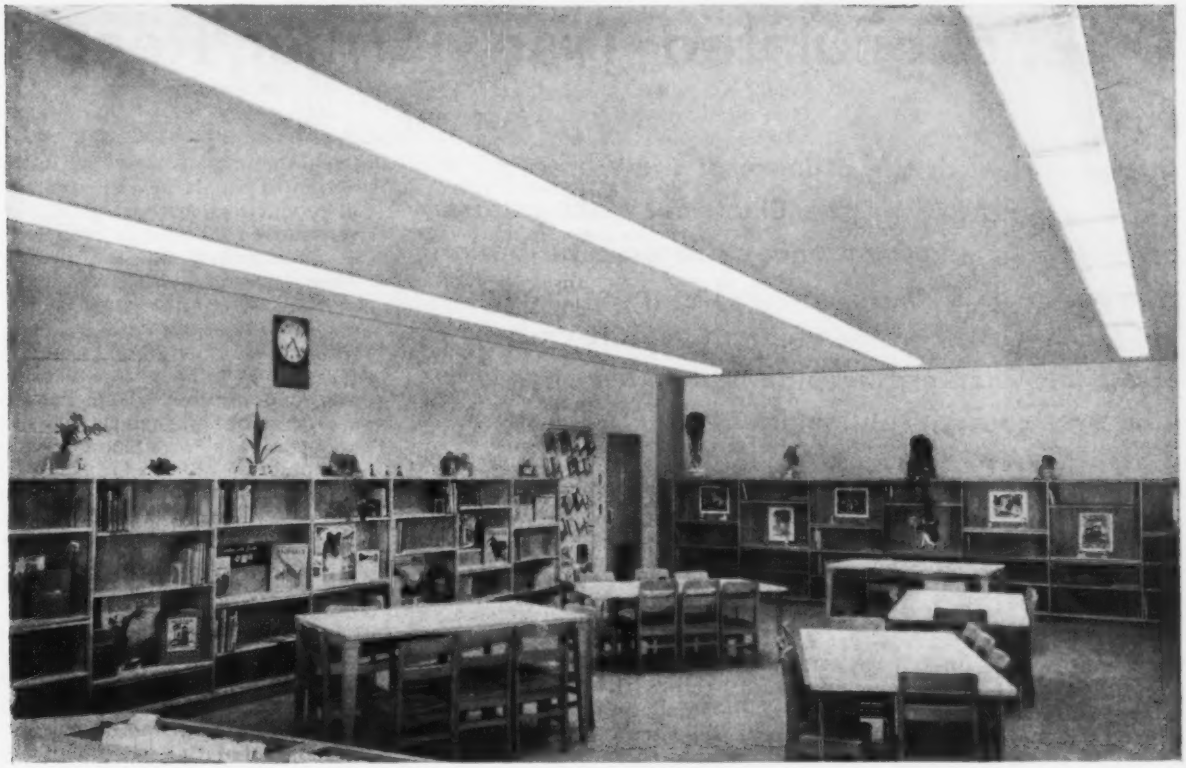
► **Clara Sherburne,** Hotpoint's Western regional home economist for 11 years, has joined the C&H Sugar Refining Corp. as home economist.

► **Harry F. Pearson** has returned from Thailand and has been appointed to head the standardization program for Pacific Power & Light Co.'s overhead distribution system. Formerly standards engineer for Portland General Electric, Pearson spent seven months in Thailand as planning engineer for the Rogers Engineering Co., which had charge of rebuilding the electrical distribution system in Bangkok.

Purdy

► Two long-time Washington Water Power staff members retired last month. They are **Jack Sheriffs,** assistant superintendent—electric construction and maintenance, who started with the company 37 years ago, and **Roy E. Furgason,** superintendent of Cabinet Gorge plant, who joined the company in 1926.

► **Wayne L. Smith** of Denver was elected chairman of the Denver Section of the American Institute of Electrical Engineers. He is utility and distribution representative in the Rocky Mountain area for Allis-Chalmers Mfg. Co., and succeeds **John E. Martin** of Public Service of Colorado. Other officers are **William J. Hanna,** vice chairman; **John E. Skuderna,** secretary; and **Horace W. Lacy,** treasurer.



HOLOPHANE coordinates LIGHTING with COLOR for agreeable environments in modern interiors

For many years Holophane technicians have designed visual environments based on sound ILLUMINEERING® principles... These provide prismatically controlled lighting for better seeing—and lighting that expresses the purpose of the space. Other objectives are: illumination to modify appearance of an area, insure safety, and complement structure.

In every case, surround colors are planned to cooperate with the light distribution, to achieve desirable brightness balance and to create an agreeable environment.

Holophane engineers offer leadership experience, high "creative sense," constant development of better, more effective, lighting methods for the economical solution of your lighting problems. Call on them through your professional advisors.

HOLOPHANE REALITE ▼

REALITE in the Classroom

REALITE® with PRISMALUME® (prismatic acrylic plastic) construction has been extensively used in classrooms. It provides fine appearance, efficient performance and low maintenance. Its reasonable cost permits wide use in commercial as well as educational fields. Levels of 75 to 150 footcandles.

Complete Your New York Stay
...Visit HOLOPHANE LIGHT & VISION INSTITUTE...New techniques, new developments... Convenient: 342 Madison Ave. (at 44th St.)

Holophane
Trade Mark

HOLOPHANE COMPANY, INC.

Lighting Authorities Since 1898

342 Madison Ave., New York 17, N. Y.

THE HOLOPHANE CO., LTD., 418 KIPLING AVE., SO., TORONTO 18, ONT.

Encapsulated Transformer Report

At the behest of the officers of the Western Underground Committee, Electrical West editors present this report on encapsulated distribution transformers. This subject is the most gravid since our series on the vacuum switch. Out of this idea can grow residential distribution of a kind and cost yet unimagined

Officers of the Western Underground Committee have identified the application of encapsulated transformers as a study project of transcending importance. The growing awareness of the members that a number of manufacturers have oil-free devices under development has triggered this redirection of the committee's activities. The efforts of the committee will be to give interested manufacturers its combined recommendations on the optimum applications of the new device. It is hoped that out of this cooperative work the lowest total cost systems will be achieved. This viewpoint recognizes the fact that the encapsulated transformers will affect the whole system, not just the transforming section.

Of particular interest to the group will be recommendations regarding subvoltages, a concept that may grow out of the voltage-cost relationship of the new device.

In addition, three underground systems will be explored. (1) A single secondary transformer per customer concept in which the transformer will be direct buried or garage mounted with the meter. (2) A multi-secondary direct burial concept. The major area of analysis in this regard will be the type of container, backfill and methods of improving heat condutivity for larger units. (3) A multi-secondary application in which a special base section for an ornamental street light would provide the transformer enclosure. This concept would allow some degree of diversity and completely do away with vaults and special burial problems.

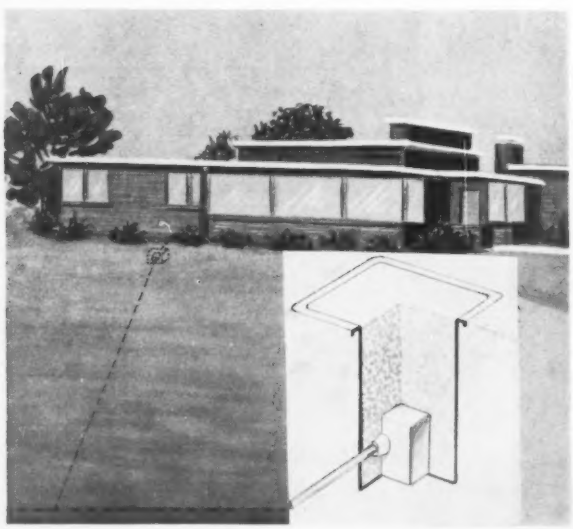
WUC President Bert Anderson, California Electric, says: "Our aim is to help the manufacturers get in the position to supply us with commercial products so that we can aggressively pursue the idea of **really low cost** underground. We feel the nature of our group will enable us to give fast and effective answers with the minimum of red tape."

While the underground committee's activities will be directed at subsurface applications, Tom Bettersworth, distribution engineer, PG and E, says it may be "possible to develop a combination overhead and underground distribution system for residential areas that would be less costly than an all-underground system and answer fully the objections to overhead construction. Such a system might consist of an encapsulated transformer mounted on top of a tapered metal pole with the primary circuit on the transformer bushings. The secondary conductors would run inside the pole to the underground and the individual customers.

"Street lights could be mounted on the same poles and supplied from the secondaries. A prime advantage would be that distribution could be put back on the street where it would be more accessible for maintenance.

"It would avoid the problems and cost inherent in high-voltage conductors, which are encountered in the all-underground system. There are

In a Westinghouse version of the unit scheme, transformer is underground. Heat transfer in normally dry soils is a problem



Artist's view of G-E's "unit residential" underground distribution scheme. Transformer and meter are housed together

major problems to be worked out before the system could be used. One of the principal ones is how to provide over-current protection for the transformer.

"In addition – equipment would have to be designed for working on metal poles that cannot be climbed like wood poles."

"This is the most productive idea we've seen this year," says Carter Blankenburg, underground superintendent at Southern California Edison. "We are updating our 1960 economic study (ELECTRICAL WEST, July 1960, p 65) to see how the 480-v system fares. We are mighty optimistic."

H. S. "Hib" Johnson, vice president at Portland General Electric: "It's intriguing! A real break with the past that may lead us in some exciting directions. We need more specific information on costs and, of course, some experience. But we see in this product the promise of lower cost underground – and improved overhead appearance."

Manufacturers Report

The following reports indicate that a sizable group of manufacturers have reached a point in their development work where they can report success in the tricky art of encapsulation and predict, enthusiastically, a rosy future. Without exception, the manufacturers and users make the following points:

1. Encapsulated transformers will emerge from the laboratory into the field testing stage during 1961. Manufacturers are looking not for mass market customers but for utility customers who will make test installations for the purpose of gaining operating experience and customers' preferences about the kind of application as well as mechanical details.

2. Each person familiar with the potentialities of oil-free equipment rapidly comes to the conclusion that optimum use of this new system component will require a sharp break with the past. In short, you don't just plug it in—it's the break-through like the jet engine around which you build an entirely new aircraft.

General Electric

The General Electric design embodies an epoxy resin encapsulated primary coil that contains a small quantity (approximately a pint) of insulating oil. Encapsulated oil-filled primaries offer the advantage of oil-filled transformer insulation levels with the size and weight advantages inherent in dry-type transformers. The G-E design weighs 25% less than conventional equipment. Presently, 15- and 25-kva sizes up to 13,200/7,620 Y are designed. Today's model requires an auxiliary weatherproof housing. Designs for pole type or direct burial are in the mill.

G-E engineers have aimed their design in the direction of a "unit residential" concept, an idea in which the units are applied one per house to Gold Medallion-type homes. In a typical application, the primary comes onto the customer's premises underground, up into the transformer housing, which would also contain metering on the secondary side. Protection for the transformer would be entrusted to the main incoming breaker on the customer's incoming service. Initial reaction to the unit residential scheme is that economics of one transformer per house would be prohibitive because of loss of diversity. On the other hand, with vanishing secondaries and no vaults, pads or secondary conduits, there appear to be important compensating savings.

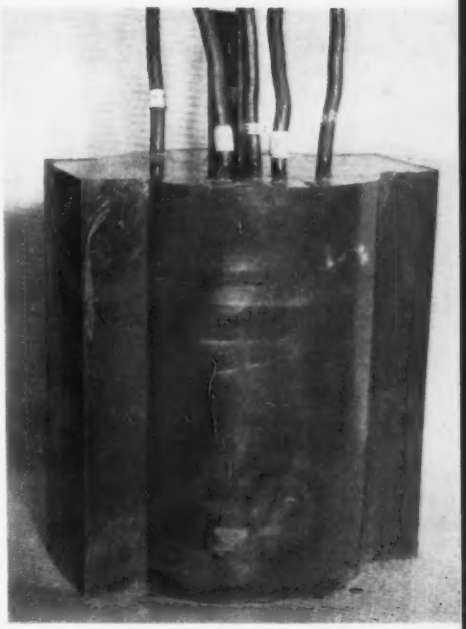
G-E engineers hope to have 50 to 100 units installed in 1961 for field testing of the unit residential concept as well as the equipment design.

Moloney Electric

Moloney Electric Co. is currently working in cooperation with three Western utility companies on systems using encapsulated transformers. Moloney Executive Charlie Auringer emphasizes the disposability in the event of failure. "We don't think economics will allow any repair, and maintenance is designed out. And insulation is equal to oil-filled units.

"What led us in this direction is our conclusion that the theoretical life of today's distribution transformer is nearly 2,000 years. Reducing this to 100 years—a twenty times change—would save the user less than 50¢. We had to make fundamental changes to make big savings for our users."

Moloney Electric began working with encapsulated materials and processing methods in 1953, when it encapsulated coils for electronic applications. In 1957, the information gained from this early experience in encapsulation was applied to distribution transformers. In 1959, Moloney encapsulated distribution transformer core-and-coil units and these units were installed underground. These transformers are connected for a continuous bucking heat run and have now completed more than a year of operation. During this time, Moloney R&D personnel have periodically measured both the temperature of the units under test and the temperature of the surrounding filler.



Moloney's unit is applicable to overhead, underground—even under water applications. Insulation levels are comparable with conventional oil units

Moloney's experimental programs with Western and Eastern users are directed toward finding the answers pertaining to installation costs, methods of application and proper designs for the various types of systems. At the present time, there are five basic methods of installation being investigated. These methods are:

1. An encapsulated transformer to serve each residence:
   (a) wall mounted
   (b) direct burial
2. Encapsulated transformers to serve four to six residences:
   (a) mounted in an enclosure
   (b) pole top mounting
   (c) vault installation

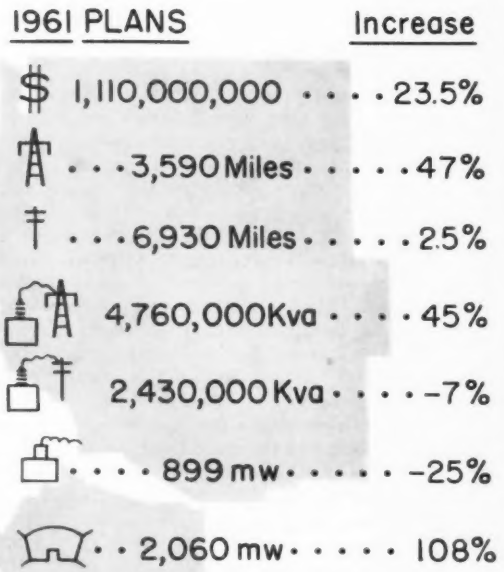
Plans have already been completed for some of the experimental applications. The first wall-mounted encapsulated distribution transformer is now being manufactured and is scheduled for installation early this year on the system of an eastern utility.

Westinghouse

Westinghouse engineers too have been active in the field. A recent design on test is a dry-type transformer for single residence installation.

Continued on Page 79

ELECTRICAL WEST
VOL. 126, NO. 2 FEBRUARY 1961



EDITORIAL COMMENT

Reading the statistical report on the following pages is a pleasant task. It reaffirms an oft-stated thesis that the West is growing faster than the rest of the U. S. This is great. Let's not lean back on our fat statistics and wait for good things to happen. Let's help them happen! Cheers!

This issue (pp 52-3) contains a progress report on the most exciting distribution development in decades—the encapsulated distribution transformer. Encapsulation combines tank, cover coolant, bushings and major insulation in the form of gunk. **Herein are exciting possibilities for distribution transformer cost reductions.** But this is only the beginning. Oilless transformers can become part of a load center concept of residential distribution. They may ultimately be direct buried—a break-through in residential underground costs. They will surely cause a new look at distribution subvoltages. **In short, they should cause the first really fundamental study of distribution practice in 50 years!**

The editors of ELECTRICAL WEST thank the many contributors to this roundup. For the manufacturers, this progress report prior to the availability of hardware represents many frustrated hopes to achieve a "first." In fact, studies of encapsulated transformer systems have rapidly become public secrets. Because of this, the possibility exists that a company could burst into print casting a shadow on much well merited work in the field.

In addition, system-wide benefits, which only users can evaluate, dwarf the benefits from a narrow product viewpoint. Hence, the compelling need to take direction from users. Hopefully this development progress report will avoid the wattless conflict of "pat" approaches such as exist today in the field of higher operating temperatures.

And new problems galore. The internal breaker and fuse are gone. If the units are to be direct buried or mounted on the customer's premise, how do we fuse? How do we switch? Here is an engineering answer that asks some pointed questions of other segments of the system. Now is the time to get to work!

And codes, they may well need a look before the full benefits can be put to use. Contractors too will have to realize that the new system will mean more electrical living, hence more wiring.

Already the Western Underground Committee has promised an aggressive crash study and evaluation of the parameters external to the transformer that can serve as guide posts to **any** manufacturer for the development of encapsulated transformers and associated components.

There have been few opportunities so laden with future promise as this. Each utility organization has the obligation to offer free, full and imaginative evaluation of this new idea. Until substantial agreement is reached on the optimum application, encapsulated transformers will remain a laboratory curio. With support, this development may substantially change the character of and economics of distribution as we know it today.

CONSTRUCTION BUDGETS ARE BIG

While Business In General Is Looking Down Or Hoping To Hold Level In 1961, Western Spending Will Be Up 23.4% From 1960

Electric utility new construction budgets for 1961 are big—up 23.4% —from the 1960 level according to reports from Western utilities representing 97% of Western meters. Maintenance and repair expenditures will add an additional $129.5 million. **That totals $1,240 billion in new construction and maintenance.** This total is dramatic in that 1951 spending was reported as $425 million, nearly one-third the figure planned for 1961. In a different context, this year's Western figure is of the same order as nation-wide utility expenditures 15 years ago. Most significant is this whopping increase at a time when most business is looking down or hoping to hold even.

The impact of Western spending takes on increased meaning when compared with nation-wide performance. A national increase of 5.1% is expected in '61. In terms of dollars, nearly all of this increase is accounted for by the 23.4% increase in the 13 Western states. The growth is in the West!

Here is a breakdown of spending:

Production plant	$ 458,000,000
Transmission plant	189,000,000
Distribution plant	408,000,000
General plant	55,500,000
	$1,110,500,000
Maintenance	129,500,000
Total expenditures	$1,240,000,000

Performance against last year's budget was poor, $888 million for new construction and $90 million for maintenance. This is $75 million from the estimated $1.05 billion of a year ago. One reason is that today's equipment prices made it possible to accomplish 1960's construction for fewer dollars. This is not the complete answer, since 1960 capacity additions did not come up to plan, falling 600,000 kw short of February 1960 plans.

Generation

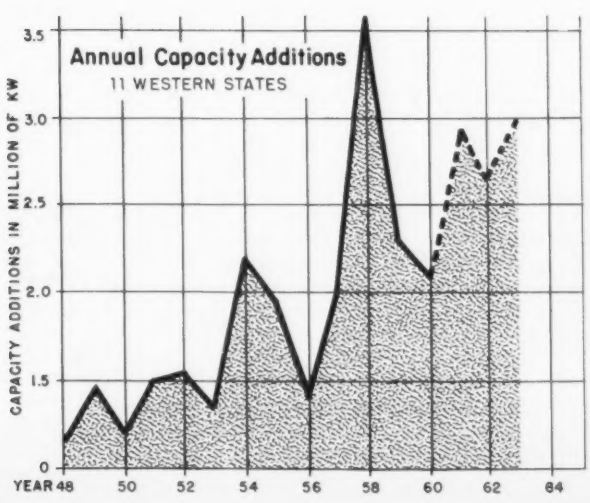
Capacity additions for '61 through '63 are at a healthy rate.

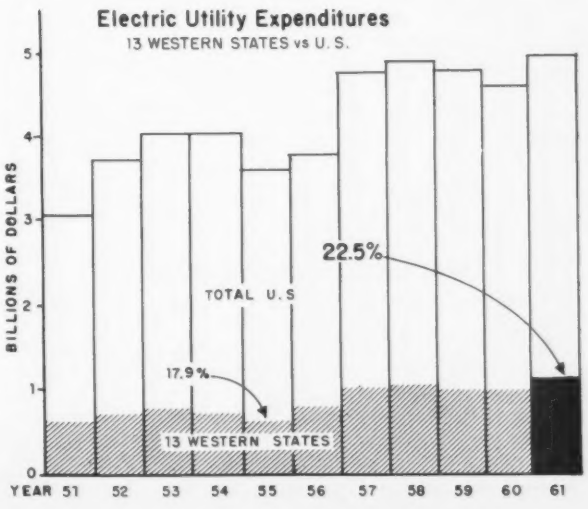
1961—2,959,000 kw
1962—2,692,000 kw
1963—3,001,000 kw

The trend from hydro to thermal generation is continuing. Here is the trend:

% Thermal	Capacity
1950	33.8
1955	39.5
1960	44.0

The thermal additions through '63 will equal 54% of the total with indications that even this percentage





will increase during the last half of the decade. Total generation by the end of 1963 should equal 39,500 kw—right on schedule for reaching 72,000,000 kw by 1975, as predicted in the June 1960 issue.

Transmission

Transmission line mile construction in '61 is up 47% from '60 to 3,590 miles of overhead. Underground transmission miles are also jumping from 6.5 miles in '60 to 9.6 miles in '61. Transmission substation capacity also takes a sharp upturn—45%—for a total of 4,760,000 kva. Still another important factor in the transmission construction picture shows 100 transmission switching stations to be constructed in '61 vs 76 last year. California leads with a planned 568 miles, with Arizona close behind with 459 miles. USBR transmission in the region will be 531 miles.

Distribution

Getting closer to the customer, distribution line miles and substation transformer kva remain approximately level at 6,930 miles and 2,430,000 kva, respectively. It is interesting to note that the distribution line miles include 280 miles of underground—up 17%. As plans are constantly being changed, a greater percentage of the distribution line miles will probably move into the underground column during the year.

Not included in these figures is a 4,000-mile segment estimated by the REA for the 13 Western states.

An interesting comparison is found in the budgeted figures showing $35 million budgeted by the REA's for 4,000 miles of distribution lines, while all other utilities budget $408 million for 6,930 miles.

Construction

According to McGraw-Hill Economist William J. Brown in the January issue of ELECTRICAL WEST, industrial building contracts in the 11 Western states were up 149% in the second half of 1960, compared to the second half of 1959.

Calendar Of Generation For The West

1961—FUEL GENERATION PLANNED

Agency	Plant	Size-Kw
Calif. Electric Power	Cool Water	62,000
Hawaiian Electric	Waiau No. 6	50,000
PG and E	Pittsburg Unit 6	330,000
Salt River Project	Agua Fria No. 3	163,200
Sierra Pacific Power	Not located	8,000
Sierra Pacific Power	Tracy Diesel	10,000
So. Calif. Edison	Hunt'gt'n Beach No. 4	210,000
So. Nevada Power	Clark No. 3	66,000
	Total	**899,200**

1961—HYDRO GENERATION PLANNED

Agency	Plant	Size-Kw
Army Engineers	Ice Harbor Lock & Dam	270,000
Army Engineers	Fort Peck No. 2	80,000
Calif. Oregon Power	Iron Gate	18,000
Grant County PUD	Priest Rapids	551,950
Idaho Power	Oxbow	190,000
Chelan County PUD	Rocky Reach	775,000
Sacramento MUD	Jaybird No. 1	66,500
USBR	Boulder Canyon	95,000
USBR	Upper Molina	8,640
USBR	Lower Molina	4,860
	Total	**2,059,950**

Total for 1961—2,959,150

1962—FUEL GENERATION PLANNED

Agency	Plant	Size-Kw
Arizona PS	Cholla Unit 1	115,000
B. C. Electric	Burrard Ther. Gen. St.	300,000
Calgary Power	Wabamun	150,000
L. A. Dept. of W&P	Haynes	230,000
PG and E	Morro Bay Unit 3	330,000
PG and E†	Humboldt Bay Unit 3	60,000
PS of Colorado	Cherokee No. 3	150,000
PS of New Mexico	Reeves Station	66,000
San Diego G&E	South Bay Unit 2	136,500
So. Calif. Edison	Alamitos Units 3 & 4	620,000
Tucson GEL&P	Irvington	100,000
	Total	**2,257,500**

1962—HYDRO GENERATION PLANNED

Agency	Plant	Size-Kw
Army Engineers	Hills Ck. Res. No. 1, 2	30,000
Army Engineers	Cougar Res. Nos. 1, 2	25,000
Eugene W&E Board	Carmen	80,000
Eugene W&E Board	Trail Bridge	10,500
PG and E	Stanislaus Replacem't	82,000
PG and E	De Sabla Replacem't	18,500
PG and E	Kings River	42,000
Sacramento MUD	Jaybird No. 2	66,500
Tacoma City Light	Mayfield	120,000
USBR	Lewiston	300
	Total	**474,800**

Total for 1962—2,732,300

1963—FUEL GENERATION PLANNED

Agency	Plant	Size-Kw
Arizona PS	Four Corner Units 1, 2	350,000
Calif. Electric Power	Cool Water	62,000
Hawaiian Electric	Kahe No. 1	75,000
L. A. Dept. of W&P	Haynes	230,000
PG and E	Morro Bay Unit 4	330,000
So. Calif. Edison	Etiwanda No. 3	310,000
So. Colorado Power	South Pueblo	44,000
Utah P&L	Kemmerer No. 1	150,000
	Total	**1,551,000**

1963—HYDRO GENERATION PLANNED

Agency	Plant	Size-Kw
Army Engineers	The Dalles Nos. 11, 12, 13, 14	312,000

The fact that utility construction budgets are up 23% over 1960's actual construction expenditures shouts "good news" to the electrical construction industry in the West. Not only will this result in contract work for electrical contractors in the area, but it also denotes the rapid growth in the utilization of electric power, which will require added commercial, industrial and residential electrical installations.

Loadbuilding

Appliance sales figures for 1960 were disappointing in view of the need for additional load. *Electrical Merchandising Week's* annual review shows that nationally major appliance unit sales slipped some 2.5% from 1959 levels. How the West did will be reported next month in Electrical West's annual report on sales activities.

Although the West still leads the nation in kwh consumption, its margin has narrowed during recent years. In 1948 average residential use in the United States was only 60% of that for the 11 Western States; in 1960 the national figure was 75.5% of the West's average of 4,877 kwh per residential customer.

And this year, promotion budgets – starting place for mid-60 expansion – are down, according to Electrical West's annual survey. Individual budgets of promotion-minded utilities are up as much as 10%, but the average dropped from more than $3 a meter reported in 1960 to $2.30 per meter estimated for 1961.

In this year's survey, 51 utilities serving 6,467,082 meters–about 69% of the total in the West–reported that they expect to spend $14,899,871 on promotion in 1961. Last year utilities serving 5,564,581 meters reported projected expenditures of $17,591,426. Slightly more than half include salaries and institutional advertising in the dollar total.

Seven of these utilities, representing 4,372,193 meters and including both private companies and public agencies, will spend $11,041,250 during the coming 12 months to build load. The combined figure for this group in 1960 was $12,034,000.

Grant County PUD	Wanapum	249,300
Oroville Wyandotte Irrigation District	Forbestown	27,000
	Kelly Ridge	10,000
	Woodleaf	49,000
Portland GE	Round Butte	274,500
Sacramento MUD	Camino No. 1	71,250
Sacramento MUD	Union Valley	33,250
USBR	Trinity	100,000
USBR	Clear Lake	134,000
USBR	Spring Creek	150,000
USBR	Flaming Gorge	108,000
	Total	**1,518,300**

Total for 1963–3,069,300

1964–FUEL GENERATION PLANNED

Agency	Plant	Size-Kw
B. C. Electric	Burrard Ther. Gen. St.	150,000
Burbank PS	Olive Ave. No. 2	44,000
Glendale PS	Glendale Steam Plant	44,000
L. A. Dept. of W&P†	Unnamed	50,000
Montana Power	Unnamed	'100,000
Pasadena L&P	Unnamed	'60,000
PS of Colorado	Valmont No. 5	150,000
So. Nevada Power	Unnamed	66,000
	Total	**664,000**

1964–HYDRO GENERATION PLANNED

Agency	Plant	Size-Kw
Army Engineers	Ice Harbor	270,000
Calgary Power	Unnamed	150,000
Calif. Oregon Power	Salt Caves	88,000
Canadian Utilities	Battle River	33,000
Grant County PUD	Wanapum	155,500
Ketchikan PU	Whitman	2,000
Tacoma City Light	Mossyrock	75,000
USBR	Glen Canyon	337,500
	Total	**1,111,000**

Total for 1964–1,775,000

1965–FUEL GENERATION PLANNED

Agency	Plant	Size-Kw
Hawaiian Electric	Kahe No. 2	75,000
Imperial Irrig. Dist.	El Centro	66,000
L. A. Dept. of W&P	Haynes	230,000
Utah P&L	Kemmerer No. 2	150,000
	Total	**521,000**

1965–HYDRO GENERATION PLANNED

Agency	Plant	Size-Kw
Army Engineers	Hills Creek Nos. 1 & 2	30,000
Army Engineers	Cougar Nos. 1 & 2	25,000
Grant County PUD	Wanapum	83,100
Tacoma City Light	Mossyrock	150,000
USBR	Glen Canyon	337,500
	Total	**625,600**

Total for 1965–1,146,600

1966–FUEL GENERATION PLANNED

Agency	Plant	Size-Kw
Calgary Power	Unnamed	210,000
L. A. Dept. of W&P	Haynes	150,000
PS of Colorado	Unnamed	210,000
	Total	**570,000**

1966–HYDRO GENERATION PLANNED

Agency	Plant	Size-Kw
Army Engineers	Green Peter Nos. 1, 2	90,000
Douglas County PUD	Wells	540,000
USBR	Yellowtail	200,000
USBR	Blue Mesa	60,000
USBR	Glen Canyon	225,000
USBR	Watasheamu	8,000
	Total	**1,123,000**

Total for 1966–1,693,000

'Not certain–thermal or hydro
*Geothermal
†Nuclear

A Statistical Review of 1960

	Customers	Power Sales Mwh	System Peak Mw	Capacity Mw	Construction $
ALASKA					
Anchorage L&P Dept.	8,450	84,000	19	7	490,000
Ketchikan PU	3,193	33,221	8	9	50,000
ARIZONA					
Arizona PS	178,500	3,240,000	651	634	26,000,000
Salt River Project	91,965	2,400,000	476	428	27,100,000
Tucson GEL&P	76,797	93,000	202	340	5,624,000
CALIFORNIA					
Alameda PU Dept.	16,353	146,000	33	0	206,564
Burbank PU Dept.	37,582	426,958	88	114	2,155,000
California Electric Power	112,700	1,802,000	365	423	17,000,000
California-Pacific Utilities	36,240	378,034	88	24	1,732,000
Glendale PS Dept.	53,300	318,000	73	104	2,100,000
Imperial Irrigation District	30,600	585,000	157	173	1,200,000
Los Angeles Dept. of W&P	949,000	7,223,400	1,600	2,003	33,300,000
Modesto Irrigation District	28,384	334,197	73	12	1,301,000
PG and E	1,976,000	23,800,000	5,130	5,608	116,000,000
Pasadena L&P Dept.	48,077	407,511	117	155	1,300,000
Riverside PU Dept.	30,400	213,000	57	0	925,000
Sacramento MUD	163,000	1,430,500	340	0	28,750,000
San Diego G&E	329,000	2,628,000	691	809	19,692,000
Southern California Edison	1,632,000	17,500,000	3,432	4,135	136,000,000
COLORADO					
Colorado Central Power	39,080	370,000	71	0	2,200,000
PS of Colorado	323,835	3,414,126	720	883	20,018,000
Southern Colorado Power	49,200	365,000	78	93	
HAWAII					
Hawaiian Electric	117,000	1,375,000	303	400	12,660,000
Hilo Electric	18,360	83,500	22	36	500,000
Maui Electric	10,500	86,700	24	28	570,000
IDAHO					
Idaho Power	137,000	3,900,000	614	825	20,774,000
MONTANA					
Montana Power	151,602	3,181,822	557	671	3,956,000
NEVADA					
Sierra Pacific Power	46,500	600,000	127	28	5,750,000
Southern Nevada Power	37,200	836,200	206	224	7,700,000
NEW MEXICO					
Plains Electric G&T	11	233,785	44	50	155,000
PS of New Mexico	100,384	970,000	213	259	11,792,000
OREGON					
Bonneville PA	117	20,000,000	4,928	7,087	20,500,000
California Oregon Power	93,800	1,440,000	386	412	8,232,000
Central Lincoln PUD	12,450	300,000	64	0	668,000
Eugene W&E Board	30,103	518,000	135	56	2,315,400
Pacific P&L	292,615	4,832,499	1,079	778	25,543,000
Portland GE	255,000	4,290,902	924	540	12,000,000
UTAH					
Utah P&L	235,700	3,710,000	694	789	17,506,000
WASHINGTON					
Benton County PUD	10,496	266,172	67	0	450,000
Chelan County PUD	16,190	412,576	69	306	1,145,274
Clark County PUD	34,500	620,000	145	0	1,250,000
Cowlitz County PUD	21,739	815,292	138	97	1,000,000
Grant County PUD	14,300	400,000	85	473	47,117,000
Grays Harbor County PUD	22,400	378,000	81	16	1,000,000
Lewis County PUD	12,041	163,000	37	0	480,000

Puget Sound P&L	225,700	2,965,000	693	435	19,100,000
Seattle City Light	233,000	4,050,000	889	777	12,424,000
Snohomish County PUD	62,000	1,169,228	248	0	2,900,000
Tacoma City Light	64,772	2,250,000	428	306	10,076,000
Washington WP	148,400	3,132,000	652	691	5,706,000
WESTERN CANADA					
B.C. Electric	350,000	3,500,000	817	1,093	38,000,000
Calgary Power	112,000	1,797,200	435	489	12,000,000

COMPARISON OF WESTERN TO NATIONAL OPERATIONS FOR 1959 AND 1960

	11 Western States		United States		% West
	1959	1960*	1959	1960*	to U. S.
Energy generated (thousands of mwh)	135,887	**149,179**	709,700	**755,000**	19.8
Energy generated hydro (thousands of mwh)	79,875	**86,000**	137,707	**154,000**	55.8
Energy generated fuel (thousands of mwh)	56,012	**63,179**	571,993	**601,000**	10.4
Per cent hydro to total	58.8	**57.6**	19.4	**20.4**	
Total installed capacity (mw)	29,239	**31,427**	156,622	**169,000**	18.3
Hydro capacity (mw)	16,805	**17,799**	30,977	**33,000**	54.0
Fuel capacity (mw)	12,434	**13,628**	125,645	**136,000**	10.0
Number of customers (thousands)	9,088	**9,352**	57,504	**58,600**	15.9

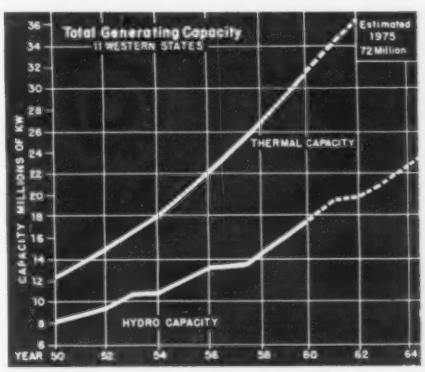
*Electrical West projections based on EEI and FPC figures through September 1960. Alaska and Hawaii will be included as soon as industry statistics reflect their statehood.

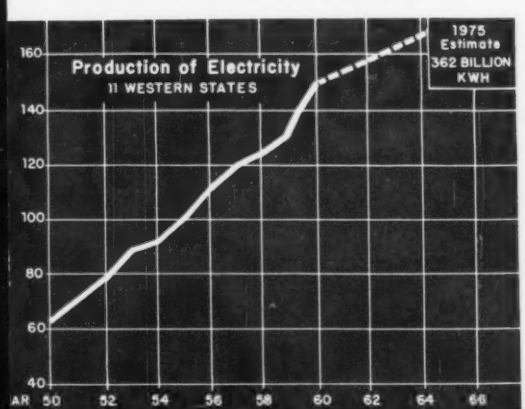
GENERATION RECORD BY STATES

(IN THOUSANDS OF MWH)

	1951	1956	1959	1960*	% WESTERN STATES
Arizona	3,960	6,035	7,865	**5,830**	3.9
California	29,375	46,575	58,195	**67,713**	45.4
Colorado	2,263	4,012	4,869	**5,544**	3.7
Idaho	2,915	4,520	6,495	**6,859**	4.6
Montana	3,303	5,494	4,934	**5,980**	4.0
Nevada	2,547	1,669	2,486	**2,728**	1.8
New Mexico	1,171	2,060	2,975	**3,224**	2.2
Oregon	5,975	13,461	13,451	**12,970**	8.7
Utah	824	2,499	2,846	**3,006**	2.0
Washington	19,914	26,223	30,319	**33,636**	22.6
Wyoming	638	947	1,447	**1,689**	1.1
Total	72,889	113,502	135,887	**149,179**	100.0

*Estimate

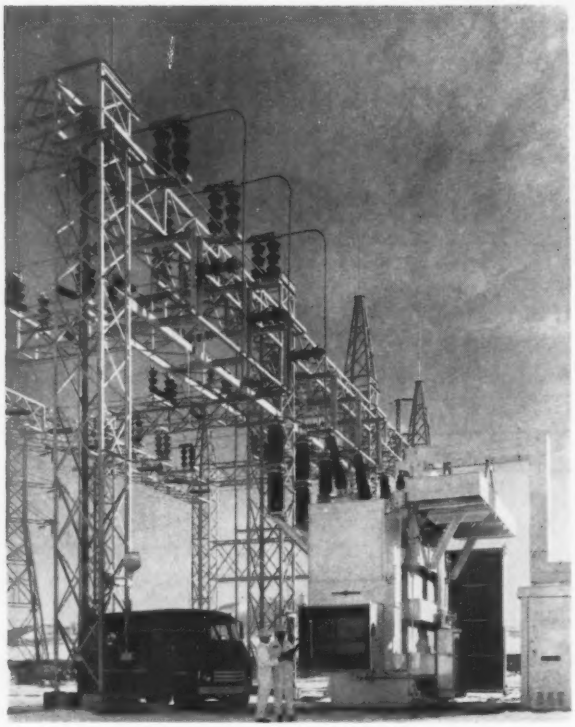




GENERATION CAPACITY BY STATES, 1960

(GENERATOR CAPACITY IN MEGAWATTS)

	HYDRO POWER	THERMAL POWER	TOTAL CAPACITY	% WESTERN CAPABILITY
Arizona	980	1,284	**2,264**	7.3
California	3,917	9,043	**12,960**	41.6
Colorado	251	1,026	**1,277**	4.1
Idaho	1,502	4	**1,506**	4.8
Montana	899	118	**1,017**	3.3
Nevada	587	134	**721**	2.3
New Mexico	25	764	**789**	2.5
Oregon	2,398	200	**2,598**	8.3
Utah	100	519	**619**	2.0
Washington	6,704	240	**6,944**	22.3
Wyoming	166	293	**459**	1.5
Total	17,529	13,625	**31,154**	100.0



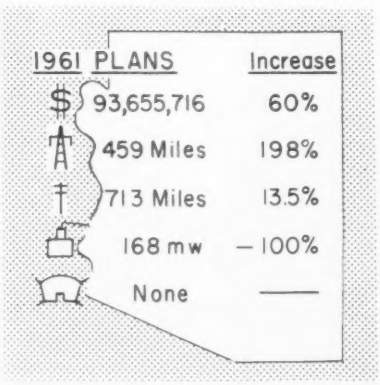
Colorado Central Power Co. of Englewood installed this neat 115/13-kv terminal during 1960 to serve fast growing Golden area

View overlooking Calgary Power's Rundle plant, housing two generators totaling 63,000 hp, the second one added in 1960

UTILITY EXECUTIVES REPORT

Arizona

Construction Budgets Skyrocket From $58 to 93 Million. Transmission Active



ARIZONA PUBLIC SERVICE

Arizona Public Service Co.'s five major electric projects in which either the engineering or actual construction started in 1960 and will continue into 1961 are as follows:

Four Corners Power Plant—Construction is expected to start early in 1961 on the utility's 350,000-kw Four Corners power plant to be built on Navajo Indian Reservation near Fruitland, N. M. Cost of the plant, which will be fueled from huge low grade coal deposits at the site, will be about $62 million. The initial two 175,500-kw units are scheduled to be in operation in 1963.

Cholla Power Plant—Construction on Arizona's first large-scale coal burning power plant started in August 1960. The 110,000-kw Cholla plant is being built east of Joseph City, Ariz., near U. S. Highway 66 at a cost of $19 million. The Cholla plant is expected to be on the line by late spring of 1962. Coal for the plant will be mined near Gallup, N. M., and hauled to the plant site by specially designed railroad cars.

345,000-V Line — Construction is expected to bein early this year on the longest 345,000-v transmission line in the United States—a 310-mile-long transmission line from the company's Four Corners power plant in northwest New Mexico to Phoenix. Beginning at the Four Corners plant, two 345,000-v lines will travel 160 miles to Cholla power plant, near Joseph City. From there, a single 345,000-v line will go south for another 150 miles over Arizona's famed Mogollon Rim and some of the most rugged country in the state to link with the Phoenix area and

tie in with the rest of the company's power system. Conductor will be carried by steel towers about 100 ft in height with an average of four to five towers per mile. Total cost of the entire line will be about $30 million. Other components of the new transmission line—construction of new switching stations and modification of another—will bring cost of the line and switching stations to $46 million.

230,000-V Cameron to Page Line—Construction started in January 1961 on a 65-mile, 230,000-v transmission line from Cameron to Page. The project is the first leg of an eventual transmission interconnection between Public Service and Utah Power & Light Co. This line will provide power for the Merritt, Chapman & Scott construction projects at Glen Canyon Dam and for the town of Page.

230,000-V Leupp to Cholla Line—Construction started in October 1960 on 54 miles of 230,000-v transmission line from Leupp to Cholla power plant near Joseph City. The new line is scheduled to be completed by May 1961.

SALT RIVER PROJECT

Scheduled 1961 construction expenditures for the power system of the Salt River Project will amount to $12 million. About one-sixth of the total amount budgeted is for the completion of Agua Fria Unit No. 3. Construction was started on this 168,000-kw unit in the fall of 1959, with completion scheduled for spring of 1961. The addition of the new unit will bring the rating of the Agua Fria station up to 390,000-kw name-plate rating.

Microwave communication will go in service between the project's central dispatching office at Tempe, Ariz., and Theodore Roosevelt Dam on the Salt River during the summer of 1961.

The project's distribution station circuit breaker outage reporting system will be expanded to include 11 more stations during 1961. Radio transmission is used and equipment automatically prints outage information on paper tape.

Four river flow gages, which report via radio, are being reconstructed to operate on low power partially transistorized equipment.

Several new recording type printing demand meters will be purchased in 1961 for installation at large power isolated delivery points, in the eastern mining area. These instruments will provide information in the form of a punched paper tape that can be readily converted, by means of a translator, to standard IBM cards and information for immediate processing in our machine accounting system.

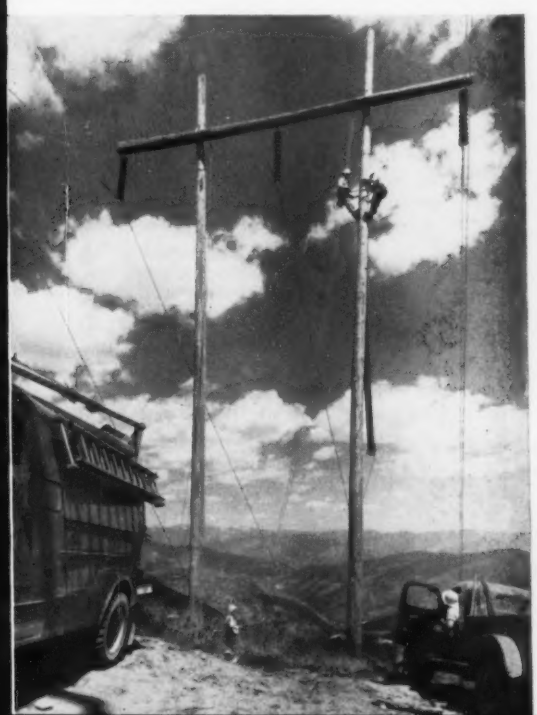
Salt River Project has ordered an IBM 1401-1620 computer for general purpose accounting and engineering uses. Delivery is to be made in 1962.

Street lighting installations are expected to continue at a high rate in the rapidly expanding residential areas of the project's service area, with 3,100 street lighting additions anticipated for 1961.

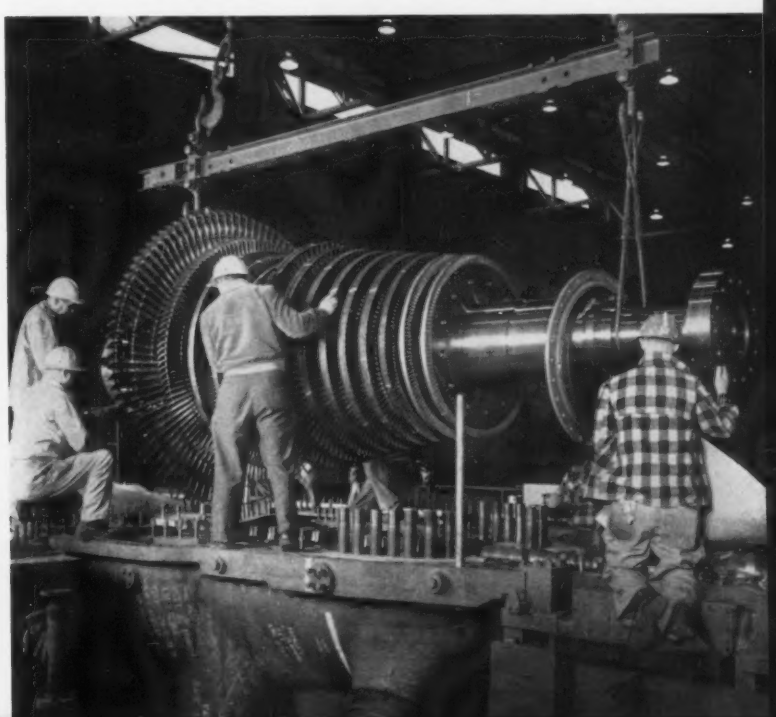
Other construction activities scheduled include the installation of 65,000 kva of distribution substation capacity, construction of 67 miles of 115-kv and 69-kv transmission line and the addition of 155 miles of 12-kv distribution lines. – T. M. MORONG, *chief engineer*.

ON 1961 CONSTRUCTION PROJECTS

Washington Water Power built 110 miles of transmission line from Noxon Rapids to load centers

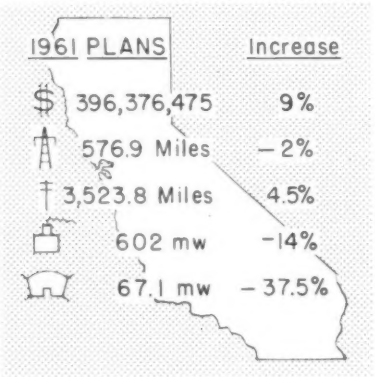


Late 1960 view of the Burrard thermal generation station of B. C. Electric Co. Ltd. showing intermediate and low-pressure stages of turbine rotor



California

1960 Peak Generation Year. PG and E Topped 5 Million Kw



BURBANK PS DEPT.

Some additional expansion of the utility system will continue in 1961. A new distributing station of 20,000-kva capacity will be constructed to relieve feeder loadings in an industrial area.

The 1960-61 fiscal year's budget is $1,327,000 which, in addition to the above station, includes some 34-kv line construction and terminations to improve distribution of power flow and reliability in the system, and new 4.3-kv overhead and underground feeder installations. — ALAN E. CAPON, *assistant general manager and chief engineer.*

CALIFORNIA ELECTRIC POWER

The first unit at the Cool Water steam plant is expected to be in commercial operation by June 1961 with a 62,000-kw name-plate rating. Load frequency control equipment is expected to be added at the Highgrove steam plant for use in connection with the transmission tie to the Lower Colorado River Pool. At Bishop Creek plant 4, two of the earliest hydrogenerators installed in 1905 are to be modernized by replacement of shafts, impulse wheels and generator windings. Ratings of each will be increased from 750 kva to 1,000 kw.

A new 43-mile transmission line from the San Bernardino area to Garnet substation near Palm Springs will be ready for operation before the summer of 1961. Fourteen miles of the line through a high fire hazard area is of steel tower construction and the remaining 29 miles use H-frame wood poles. The line is constructed for ultimate 230-kv service but it will operate for the first few years at 115 kv.

Major transmission substation activity will include expansion of Garnet substation to accommodate the new incoming transmission line from San Bernardino, the addition of 34.5-kv bus regulation at Inyokern substation, the increase in transfer bus capacity and addition of bus differential protection at San Bernardino substation and the addition or replacement of 115-kv oil circuit breakers at three other transmission substations.

New distribution substations and transformer capacity increases will add approximately 39,000 kva to various 34.5-kv substations. A total of approximately 51,000 kvar of shunt capacitors is expected to be added to the system at various locations. The continuing program of cutting over lower voltage distribution areas to 12 kv will be extended during 1961.

Considerable activity will be experienced in reinsulating and reconductoring important transmission and distribution circuits. – W. T. JOHNSON, *vice president and assistant general manager.*

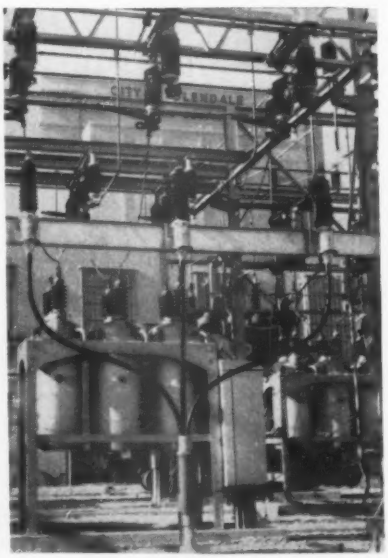
CALIFORNIA-PACIFIC UTILITIES

The substantial growth in the use of electricty in practically all divisions of the company's service area will require the expenditure of a large portion of the 1961 construction budget for facilities needed to provide increased distribution system capacity. Kilowatt-hour sales increased approximately 10% during the past year; consequently many parts of the system will require the addition of new capacity to keep ahead of growth.

Our construction plans also include numerous rural line extensions, a number of which will provide service for new irrigation pumping loads. Growth in use of service in many rural areas will also require addition of facilities to provide increased capacity.

Our company's 1961 construction budget, in excess of $3¼ million, provides for expenditures of nearly $2 million on our electric properties. With forecasts that indicate continued growth in use of electric service by all classes of customers, approximately 50% of our budget will be devoted to the addition of new loads. An analysis of proposed budget expenditures enables us to classify them as follows: for the addition of new line extensions, transformers, meters and services to provide electric service for new loads in urban areas, 28%; for the addition of new line extensions, transformers, meters and services to provide additional electric service in the company's rural service area, 22%; for addition of substation distribution system capacity, replacements and the rebuild of numerous sections of existing distribution system on the company's service areas, 40%; and for miscellaneous construction, new tools and transportation equipment, 10%. – F. K. ALBERT, *president.*

Termination of city of Glendale's 34.5-kv underground circuits. The cable is 500 mcm polyethylene insulated, rated at 40 kv



GLENDALE PS DEPT.

The current 1960-61 fiscal year's budget for capital expenditures is $1,800,000, of which approximately $200,000 is for the completion of the No. 4 unit of the steam-electric power plant.

Projects planned for the remainder of the year include the construction of a 10,000/12,500-kva substation, the re-arrangement of substation distribution areas so that new loads may be served from the released capacity, the completion of the installation of two 34.5-kv underground circuits and the installation of pole-type capacitor units to provide voltage improvement on low power factor feeders and to release additional capacity.

The city's street lighting improvement program will be continued. It is expected that 131 20,000-lumen mercury vapor units will be installed

as continuous lighting on one major thoroughfare. Also approximately 200 2,500-lumen incandescent units will be installed during the remainder of the year.—L. W. GRAYSON, *general manager and chief engineer.*

IMPERIAL IRRIGATION DISTRICT

During the year 1961, Imperial Irrigation District plans the construction of 55 miles of 161-kv transmission line between Niland and Coachella to provide needed extra transmission capacity for the increased loads in the Coachella Valley.

In line with the policy toward the full development of hydraulic generation capabilities, the district is including in the reconstruction required at Double Weir the installation of two 300-kw hydro units using induction generators. These units will be completed early in 1961 and will be entirely automatic in operation.

The present load forecasts indicate that the district will require the installation of at least a 66-mw steam unit by the year 1965. Planning for this unit will be done during the next year.

Construction of three new distribution substations are planned to cover load growth in the coming year.

LOS ANGELES DEPT. OF W&P

The construction program for 1961 provides $54,080,000, with the major project, the Haynes steam plant located just north of the city of Seal Beach, accounting for programmed expenditures of about $13,500,000. Initial installation will be two 230,000-kw units scheduled for operation in August 1962 and June 1963. Estimated cost of the first two units, including common facilities for six units, is approximately $57,500,000.

Construction will begin on the 230,000-v transmission lines from Haynes steam plant to receiving stations A (1630 N. Main St.) and F (1506 De La Torre Way). These lines will be overhead conductor strung on steel towers and will be completed in 1962. Estimated total cost of the transmission lines from Haynes steam plant will be approximately $5,500,000.

Construction of new receiving station Q on the site of Harbor steam plant in the Wilmington area is scheduled to begin in January and will be completed in July 1961. Initial installation will be a control house, 34,500-v switch rack and two line positions at an estimated cost of $416,000. Construction of new receiving station R on the San Fernando power plant site is scheduled to start in February and will be in operation in June 1961. Initial installation will consist of two 30,000-kva, 115/34.5-kv transformer banks at an estimated cost of $167,000.

Construction of new distributing station 16 at 739 S. Los Angeles St. will be completed in the summer of 1961. This station, which will be entirely underground with roof parking space, will have a capacity of 50,000 kva and will cost approximately $1,463,000. Another distributing station will be constructed at 541 W. 152nd St., scheduled to begin in late 1961 with completion by summer of 1962. This station will be fence-enclosed with an initial capacity of 10,000 kva. Estimated cost is $388,000.

Construction of a new overhead district headquarters in the Wilmington area will begin in August 1961 and be completed about April 1962. Construction will begin on the San Fernando Valley general service headquarters at Van Nuys in the spring of 1961 with completion scheduled for fall of 1962. Estimated total cost will be $3,500,000. This facility will include electrical and mechanical shops, warehouse, automotive facilities, underground headquarters, oil depot and other related works. IVAN L. BATEMAN, *chief electrical engineer and assistant manager.*

MODESTO IRRIGATION DISTRICT

Capital expenditures for 1960 were approximately $1,301,000 and are anticipated to be $1,805,000 in 1961. The 69/12-kv transformer capacity of substation A was increased by 15,000 kva and 10,000 kva of 69/12-kv capacity has been installed at another station. During the year of 1960, approximately 700 new meters were added to the system.

A new 50,000-kva, 115/69-kv transmission substation is to be built which will be connected to our existing system by 10 miles of 115-kv wood pole line.

About 17.5 miles of 12-kv and 4-kv distribution lines were constructed in 1960 and a comparable rate of construction is anticipated in 1961. Normal conversion of 4 kv to 12 kv will proceed in fringe areas as has been our policy for the past several years.

Two new 12-kv underground vaults containing a total of 1,750 kva of 12 kv capacity were added to our downtown network. These were added to serve the new Stanislaus County Courts Building and the new Modesto City Hall.

Many scenes similar to the one shown above were observed in Los Angeles during 1960 as the city's Department of Water & Power system added 24,000 new electric customers

This 80-ft steel tower will be a portion of California Electric Power Co.'s 43-mile 230-kv line, providing a third source from San Bernardino to the Palm Springs district

PACIFIC GAS AND ELECTRIC

Northern and central California has continued its rapid growth, and our pace of staying ahead has again accelerated. The maximum demand on our system occurred on July 21, 1960, when the peak reached 5,130,000 kw, 12% higher than for 1959.

Gross capital outlay for electric plant in 1960 amounted to approximately $116 million, compared to the 1959 expenditure of $113 million. It is estimated that this figure for 1961 will be $131 million.

New generating capacity of 342,500 kw was added last year, with the completion of a new geothermal unit at The Geysers power plant and a fifth conventional thermal unit at Pittsburg power plant. The total system generating capacity at the end of 1960 was 5,608,000 kw.

Also under construction is the Kings River hydro plant scheduled for completion in mid-1962. This plant, located at the lower end of our Kings River chain of reservoirs and plants, will have a capacity of 42 mw. This construction will complete the $80 million Kings River development, which will bring the total generating capacity on the Kings River to 313 mw.

Surge chamber excavation at outlet end of tunnel No. 2 on PG and E's Lower Kings River development. When completed, chamber around this pilot will be 30 in. in diameter

PG and E's Kings River power house. Close-up view of first section of penstock being installed. Subbasement steel in foreground

Work was started last November on our nuclear unit at the Humboldt Bay power plant site near Eureka, to be known as Unit No. 3. This advanced boiling water reactor unit is being financed entirely by the company, including research and development. Bechtel Corp. is designing and constructing the plant under a turn-key contract, with General Electric Co. supplying the nuclear and electrical equipment. During the past year, the development program on pressure suppression containment was brought to a successful conclusion. This unique containment design is believed to be a significant advance in the art. With it, in the event of an operating accident, escaping steam from the primary system would be quenched in a water pool, thereby limiting pressure rise. The unit will have an expected output of 60 mw and may reach an output of 70 mw. Service is scheduled for 1962. The estimated cost for this construction is $20 million.

Construction is starting on the addition of two new 330-mw conventional steam-electric generating units at our Morro Bay power plant at Morro Bay in San Luis Obispo County. Now capable of generating 330 mw with two existing units, Morro Bay will be expanded to three times its present size, making it our second largest generating plant. The new units will require installation of additional sea water evaporating facilities. Of an improved design, each evaporating plant unit will have a capacity of 72,000 gal per day, making the steam generating units self-sufficient for fresh water. Cooling water for the new units will be drawn from Morro Bay, circulated and returned to the ocean. Unit No. 3 is scheduled for operation in 1962 and Unit No. 4 will be placed in service in 1963. The cost of this additional 660 mw is estimated at $80 million.

It is planned to replace the 52-year-old Stanislaus hydro plant with a new plant of more than double the original capacity. The existing plant, located on the Stanislaus River in Tuolumne County, was placed in operation in 1908 and has a capacity of 40 mw in four indoor units. This plant will be replaced with a single unit outdoor plant of approximately 82 mw capacity. The installation will include a steel penstock about 4,650 ft in length from the existing forebay. Present plans anticipate that the plant will be operative in the winter of 1962. This construction is estimated to cost $12 million.

When the present power plant construction program is completed, Pacific Gas and Electric will have 78 thermal and hydroelectric power plants with a total capacity of approximately 6,750,000 kw.

During 1960, 1,077.5 mva of transmission and distribution substation transformer capacity was added to the system. During the current year an estimated 1,668 mva will be placed in operation. These totals for 1960 and 1961 include 396.5 mva and

384.0 mva, respectively, of step-up capacity at generating plants.

In 1960, 135 lines of transmission (60 through 220 kv) and over 1,300 line miles of distribution lines were added. For the current year, 315 and about 1,400 line miles, respectively, are planned for construction. At the end of 1960, system transmission and distribution lines totaled approximately 74,000 line miles.—JOHN F. BONNER, *vice president in charge of engineering.*

PASADENA MUNICIPAL L&P DEPT.

During the fiscal year 1959-60, energy sold in Pasadena exceeded the previous year by 6.12%. Total revenues increased by 6.77%. Additions to capital amounted to $1,342,647.03. Distribution transformers in service increased from 156,665 kva to 168,964 kva or 7.85%. Number of meters increased from 49,499 to 49,945 or 0.90%.

The 4-kv conversion program in the Santa Anita substation areas has been completed.

A temporary two-circuit unit has been placed in service at Del Mar substation.

A third four-circuit unit has been installed and placed in operation at Chester substation.

The second and third four-circuit units have been ordered for the Fair Oaks substation and will be placed in operation during the next fiscal year. The third 34,000-v line between receiving station C and Santa Anita substation is approximately half completed.

During the year No. 8 generator received a major overhaul, including replacement of spindle blading.

The department's major construction projects contemplated for the next few years with tentative schedules are: installation of second and third units at Fair Oaks substation, 1960-61; installation of third 34,000-v line to east Pasadena, 1960-61; increase capacity of tie line to Los Angeles, 1961-62; conversion of remaining 2,400-v distribution circuits to 4,160 v, 1960-61; and new generating capacity, 1964-65—T. M. GOODRICH, *general manager and chief engineer.*

RIVERSIDE PU DEPT.

Conversion of the city's transmission system from 33 kv to 66 kv is the major project under way at the beginning of 1961.

A 20% increase in system peak demand in the past year points up the advisability of increasing this voltage to keep pace with the predicted load growth in Riverside, which is expected to continue well ahead of the national average.

Also under study, at present, is consideration of expanding distribution service into the sparsely settled environs of the city at 12 kv—a deviation from the existing standard 4-kv distribution voltage.

A 7,500-kva mobile substation has been purchased and scheduled for midyear delivery and will be available during the 66/33-kv voltage transition period.—DON CAMPBELL, *utilities engineer.*

SACRAMENTO MUD

Generation from the district's first power plant will begin this spring. Jaybird No. 1, a 66,500-kw unit on the Upper American River hydroelectric project, will initially draw water from the Ice House reservoir which was completed and began storage last year. Construction on the second Jaybird unit will begin late in the year.

About $26 million will be spent during this second full year of construction on many features of the project, now 40% complete. Union Valley Dam, the largest project reservoir, with 271,000 acre-ft of storage, will be practically complete at the end of the year. Also near completion will be a five-mile tunnel to the Camino plant, the second generation site. Construction on the Robb's Peak tunnel for diversion of water into Union Valley will continue. Additional features to be started this year include: Camino power house (71 mw); Union Valley power house (33 mw); Loon Lake reservoir with a 75,000 acre-ft capacity; Slab Creek Dam, an afterbay structure for Camino; and additional diversion features above Robb's Peak tunnel on Gerle Creek. Microwave, carrier current and supervisory control facilities necessary for unattended operation of Jaybird and other plants will be completed early this year.

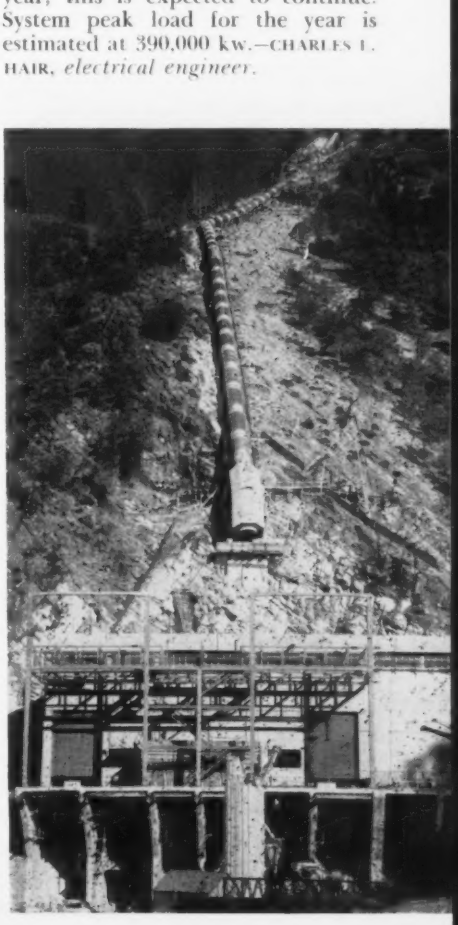
Continuation of last year's 13% increase in energy use by district customers will require about $8.5 million for other plant construction and maintenance. Heavy concentration on deferred maintenance work in the distribution system will be started this year with the addition of more crews in the line division.

Station B, the district's architecturally designed underground supply station, will be completed and will feed the third secondary network when feeders and ties are completed. Only minor additions to transmission lines and major substations are planned this year.

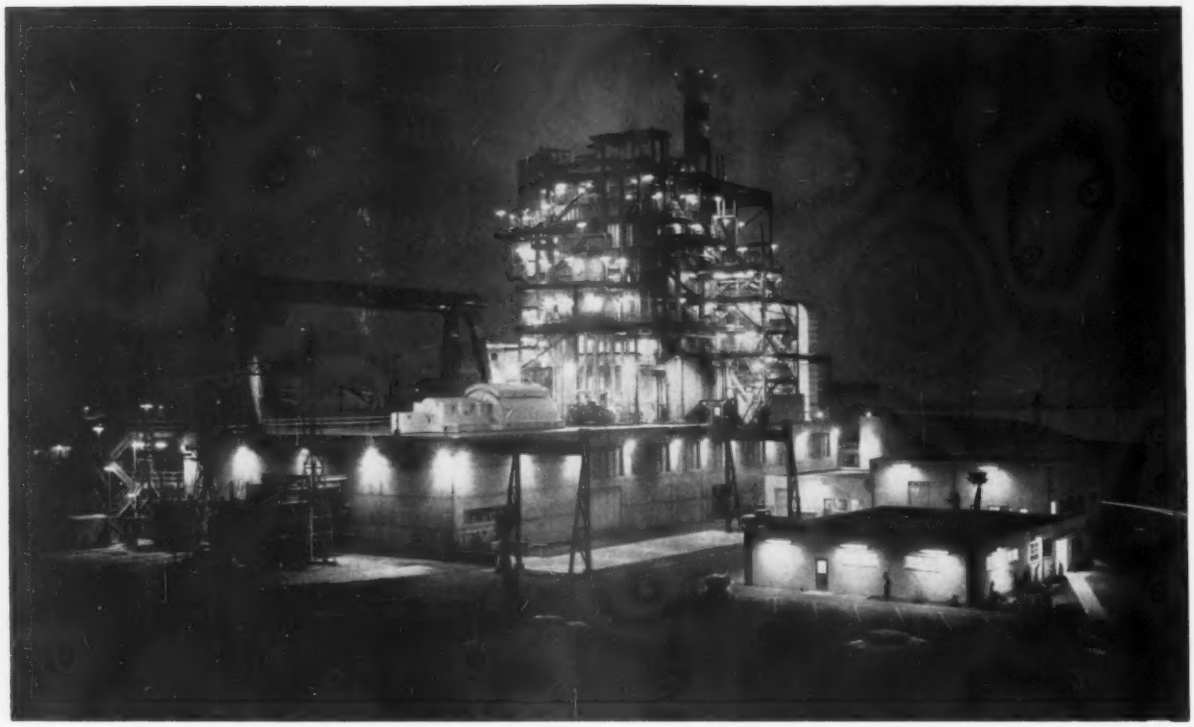
Distribution substations double the size previously used will go into service as certain smaller units are shifted to the planned two per site. A total of 40 mva of station capacity will be added. Conversion from 4 to 12 kv of 49 miles of line is scheduled in this continuing program. Preassembly construction methods will be initiated in the extension and reconductoring of about 170 miles of distribution lines during the year. About 42 mvar of primary capacitors will be added to lines and stations before summer.

A remapping program of the district's distribution lines is expected to take 3½ years. Beginning this year with establishment of major controls and base maps using photogrammetric survey methods, data will be transferred from existing maps to the new expanded scale system.

About 9,000 new customers are expected during the year. System peak, historically occurring during the winter, shifted to summer last year; this is expected to continue. System peak load for the year is estimated at 390,000 kw.—CHARLES I. HAIR, *electrical engineer.*

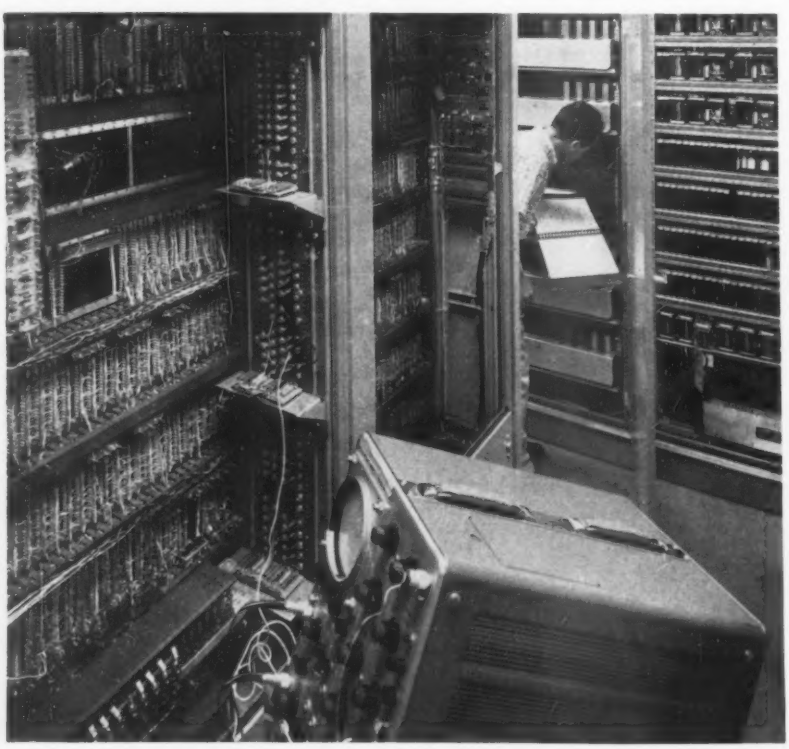


Sacramento Municipal Utility District's 1,540-ft-head Jaybird power plant. First 67-mw unit will be in operation this spring



Night lighting produces a striking effect at San Diego Gas & Electric Co.'s new South Bay power plant. The first 142,000-kw unit was completed in July 1960. The second unit, which is similar to Unit No. 1, will cost about $18,969,000 and is scheduled for commercial operation in July 1962. Electric production facilities will receive the lion's share of expenditures this year

A mechanical mind that can remember as many as 2,000 chores to be done is being installed at Southern California Edison Co.'s Huntington Beach steam station. The equipment will make the station's third and fourth units first in the world to be automated



SAN DIEGO G&E

The 1961 budget contemplates expenditure of $23,123,000 for electric plant construction.

Electric production facilities will receive the lion's share, $10,541,000 being allocated to continuation of work on the second 136,500-kw (name plate) unit at South Bay power plant. This second unit, which is similar to Unit No. 1, will cost about $18,969,000 and is scheduled for commercial operation in July 1962. An additional $156,000 will be spent for improvements at three other power plants.

Expenditures for transmission facilities will total $2,930,000 in 1961. This amount includes $1 million for a second 138-kv circuit from Encina power plant to the Escondido area where considerable load growth has occurred in the past few years

Customer growth, which in 1960 (14,100) was appreciably less than the record year 1959 (21,924), is expected to increase somewhat in 1961 and to add about 15,700 new customers to the system. This continued growth will require expenditure of about $2,700,000 for new customer extensions and $1,700,000 for purchase of distribution transformers and meters. Other line and substa-

tion additions or replacements will raise distribution plant expenditures in 1961 to an estimated $8,473,000.

Three more operating headquarters will be built in 1961, at a total cost of almost $1 million. One of these will be at a new location, while the other two will be replacement quarters for existing district operating groups. Both electric and gas operations will be handled at these decentralized facilities.

SOUTHERN CALIFORNIA EDISON

Currently under construction or authorized for construction are 1,150,000 kw of new steam generating capacity consisting of Unit No. 4 at Huntington Beach steam station, Units No. 3 and No. 4 at Alamitos steam station and Unit No. 3 at Etiwanda steam station.

The present net effective operating capacity of the two original units at Huntington Beach steam station is 435,000 kw. Construction work on Units 3 and 4 was started in May 1959. Unit 3 was made available for system operation on Dec. 5, 1960, and Unit 4 is scheduled for commercial operation in July 1961. With the preliminary effective rating of 230,000 kw for Unit No. 3 and the presently estimated net effective operating capacity of 220,000 kw for Unit No. 4, the total net effective operating capacity of the station will be 885,000 kw.

Presently estimated cost of the two new units at Huntington Beach, excluding cost of land and land rights and excluding presently estimated cost of new transmission lines and appurtenant facilities, is $55,800,000.

Construction work on Alamitos Unit 3 was started in March 1960 and on Unit 4 in September 1960. Each unit will have a turbine-generator set rating of 310,000 kw. The turbine-generators will be cross compound units with a high pressure turbine and an intermediate pressure turbine on one shaft rotating at 3,600 rpm and coupled to one generator, and a low pressure axial flow exhaust turbine on a second shaft rotating at 1,800 rpm and coupled to another generator. There will be no separate auxiliary generators and auxiliary power for the units will be obtained from the bus of the main generators through transformers. They will be outdoor type with centralized control facilities. Sea water from Alamitos Bay and the Los Cerritos drainage channel, through a canal leading to a screenwell structure, will be used for cooling purposes. Estimated cost of the two units, including general overhead but excluding transmission line facilities and any allocation of certain joint facilities constructed as part of Units 1 and 2, is currently estimated at $78 million. Unit 3 is scheduled for commercial operation in January 1962 and Unit 4 for August 1962.

Management has authorized construction of a third unit at Etiwanda steam station and an application to the California Public Utilities Commission for a certificate of public convenience and necessity is in preparation. The unit will be similar to Alamitos Units 3 and 4 and is expected to add not less than 310,000 kw to the generating resources of the company. It is scheduled for commercial operation in June 1963.

To provide for the future needs of its electrical customers and to cooperate with air pollution control authorities, Edison has entered into a 20-year agreement under which Tennessee Gas Transmission Co. together with Petroleos Mexicanos, the Mexican government oil and gas agency, would deliver up to 455 million cu ft of gas per day from rich new fields in Texas and Mexico—sources of natural gas that have previously been unavailable to this area.

Planned for construction in 1961 are nine new distribution substations. These new stations, together with additional transformer capacity to be added during 1961 to existing transmission and distribution substations, will require approximately 810,875 kva of new transformer capacity.

Plans are in progress to construct 947 line miles of transmission and distribution circuits in 1961 and to connect approximately 70,000 new meters.

Southern Colorado Power Co. of Pueblo added this 115/69-kv, 41.6-kva transformer to its West Station during the past year

Colorado

Spending Goes Up 7%. T & D To Get Lion's Share Of The Money

1961 PLANS		Increase
$	38,724,000	74%
	179.2 Miles	753%
	325.5 Miles	19%
	None	-44mw
	None	—

COLORADO CENTRAL POWER

Colorado Central Power Co. expects to spend $3,150,000 for construction during 1961. Approximately $1,250,000 will be spent for connecting new customers during the year. It is anticipated that the company will spend approximately $1,650,000 for major system improvements and increased capacity during 1961.

Nearly $250,000 will be spent for buildings, transportation and miscellaneous equipment during the year.

A new engineering and operations headquarters building will be completed and occupied about the first of February. It will be electrically heated with a combination of heat pumps, baseboard and auxiliary units. This building will also house our communications and dispatching center as well as our supervisory control.

The new telemetering and supervisory control equipment will be the new solid state type.—LEE R. JONES, *executive vice president.*

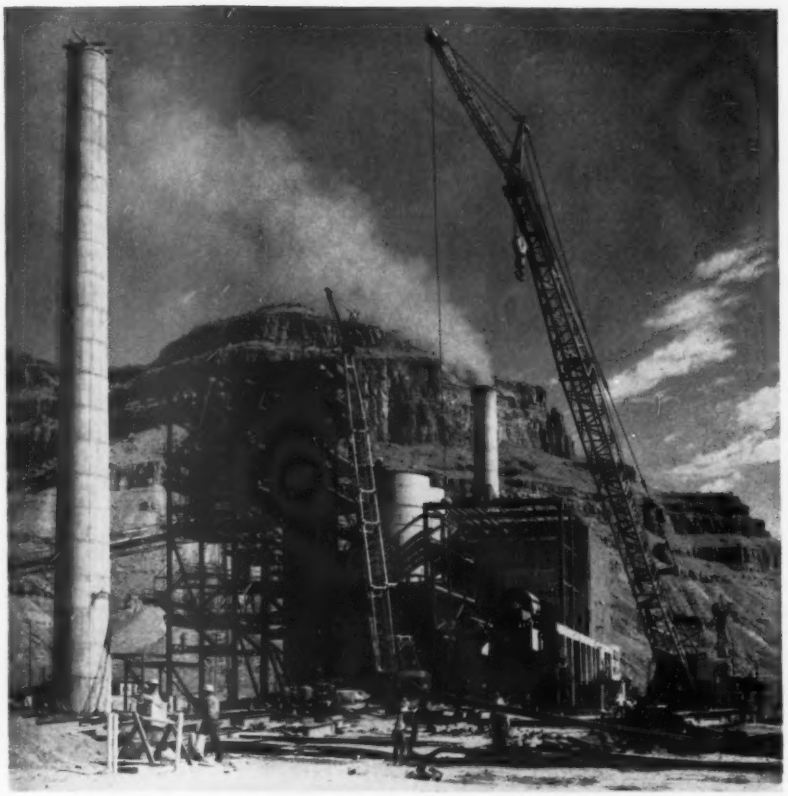
PUBLIC SERVICE OF COLORADO

The 1961 electric operating construction budget of nearly $34 million includes a major portion of construction on the company's first 150-mw generating unit which will be installed at Cherokee plant early in 1962. An indication of continuing customer growth may be gained from the fact that two more unit-type sub-

stations, in addition to normal substation additions, and approximately 144 miles of transmission line are to be energized during 1961. The company also plans to occupy its new 12-story main office building late in 1961. Construction on the new Denver headquarters was started in September of 1959.

SOUTHERN COLORADO POWER

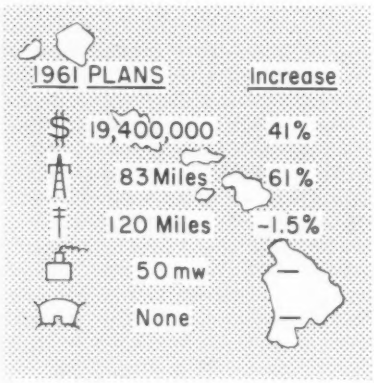
Our plans for the year of 1961 are concerned chiefly with distribution, mostly rebuilding of existing lines which have almost reached the end of their useful life. This will include reconductoring of feeders and conversion to higher voltages. Some work on transmission lines will be done, such as changing from steel to wood crossarms and installation of shield wires on old lines to improve BIL and lightning protection. —W. C. PORTER JR., *vice president in charge of operations.*



Public Service Co. of Colorado placed an additional 44,000-kw generator on the line in May of 1960 with the addition of Unit No. 2 to its Cameo plant shown above

Hawaii

Predict Continuing Growth For Area. Transmission Up 61%



HAWAIIAN ELECTRIC

The year 1961 will see the completion of Waiau Unit No. 6 and the start of construction of Kahe Unit No. 1. Waiau Unit No. 6 construction started in July 1960 and commercial operation is planned for August 1, 1961, with an expected capability of 55 mw. Developments of Kahe Valley into a site for both steam and nuclear power plants will begin in the latter part of 1961. The first steam unit, with an expected capability of 82.5 mw, will be in commercial operation by 1963.

In conjunction with the completion of Waiau No. 6, a new 138-kv switching station at Waiau will be built. Two 138-kv lines from this switching station will terminate at a new 138-kv substation at Koolau, where two 30/50-mva transformers will step down to seven 46-kv circuits radiating from Koolau to various distribution substations.

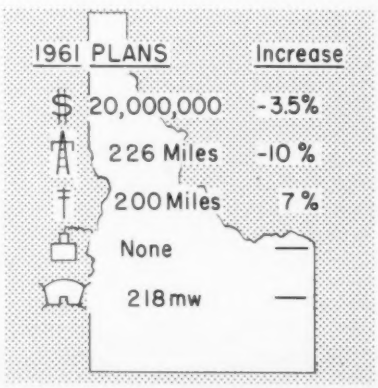
These new facilities will result in six 15-kv, 23 46-kv and seven 138-kv additional oil circuit breakers controlled by the load dispatcher in Honolulu by carrier current supervisory, with 15 of these ocb's requiring automatic synchronizing equipment. In addition, 13 different electrical quantities can be telemetered to Honolulu upon demand, with 13 different alarms for indicating trouble in the 138-kv or 46-kv switching stations.

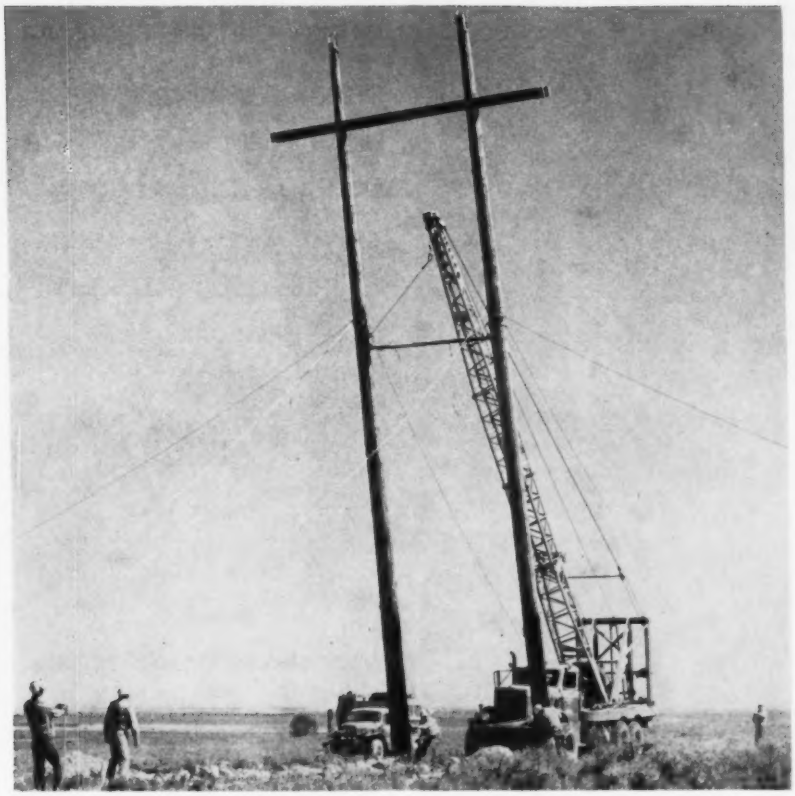
Hawaiian Electric Co. added 45 miles of residential underground distribution to its system during 1960.

It is expected that over 200 pad-mounted transformers serving approximately 2,700 homes will have been installed in various 7.2-kv underground subdivisions by the end of 1961. Use of pad-mounted transformers, together with other changes in system design, has resulted in a substantial decrease in the cost per lot today as compared to that of a few years ago. — L. W. LENGNICK, *vice president and executive engineer.*

Idaho

1961 To See Start-up Of Oxbow's First Four Units, Adding 218 Mw



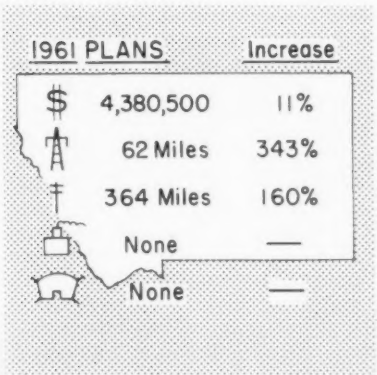


This 138-kv line, built by Idaho Power Co., crosses 125 miles of desert country to connect Idaho Power with the Elko-Lamoille Power Co. The interconnection is at Wells, Nev.

A report by the U. S. Bureau of Reclamation, the Army Engineers and the Bonneville Power Administration on their work in Idaho and Montana will be found on pp 75-78.

Montana

Another Banner Area For T & D. Transmission Up 343%; Distribution 160%



IDAHO POWER

Major projects starting or continuing in 1961 on the Idaho Power Company system.

Oxbow Dam, second unit in the company's new three-dam development, will be completed and in full initial production by the fall of 1961. Start up of Oxbow's first four units will add 218,000 kw.

Fall also will see completion of a second 230,000-v transmission line, 190 miles long, between Boise and American Falls. This will be H-frame, wood-pole construction carrying two 715.5-mcm bundled conductors per phase.

A 25,000-kva substation will be constructed near Mountain Home to furnish a firm supply for Mountain Home Air Force Base and surrounding area.

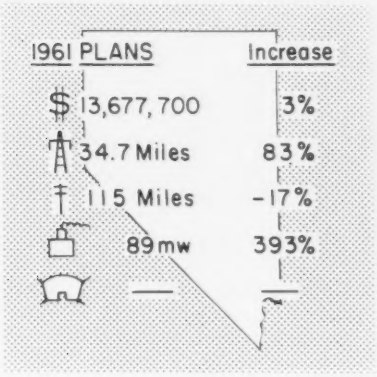
Irrigation pumping continues to expand and it is expected that more than 20,000 hp of new pumps will be connected in 1961.

MONTANA POWER

No generation projects are planned at this time and no major transmission lines are to be built in 1961. The $4,380,000 to be spent on electric construction is entirely made up of routine items—system additions and betterments to meet the requirements of our steadily increasing number of customers. – COLIN W. RAFF, *vice president.*

Nevada

Steam And Diesel Move Into The Desert As Thermal Plans Shape

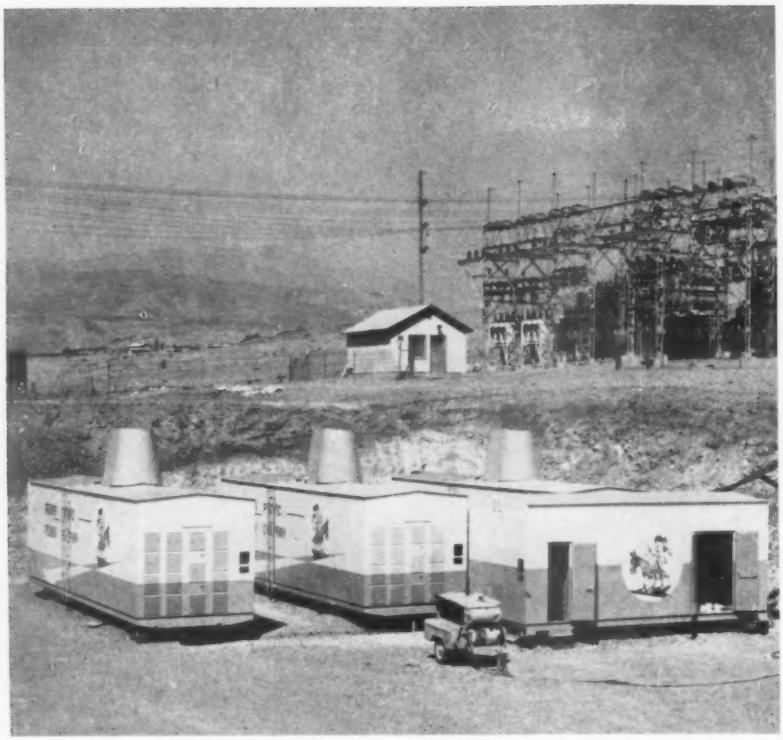


SIERRA PACIFIC POWER

The 1961 electric construction budget of Sierra Pacific Power Co. will be allocated 33% to new and improved generating facilities, 13% to transmission lines and substations, 50% to extension of distribution facilities, and the remainder to the improvement of general plant.

The continued rapid expansion of the service area will require the installation of an additional 18,000 kw of diesel-driven peaking genera-

Hawaiian Electric Co. added 45 miles of residential underground distribution in 1960



Reddy rides his burro across these diesel generating units, which were added to the system by Sierra Pacific Power Co. in the fall of 1960. Each unit is rated 2,000 kw

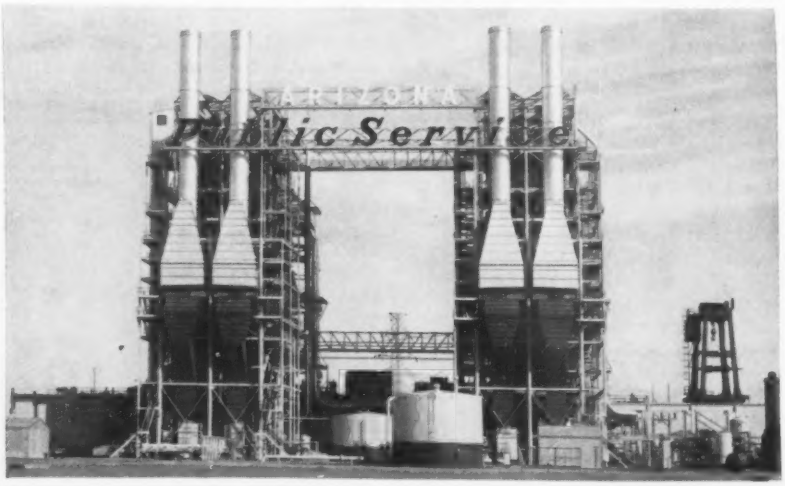
tion to meet the increased demands of 1961. This is another step in the long term generating plan outlined in the November 1960 issue of ELECTRICAL WEST. Five 2,000-kw diesel-driven generators are scheduled for installation at the Tracy substation, site of the ultimate steam-electric generating plant, about 15 miles east of Reno.

Four additional 2,000-kw units will be installed at other locations in the system area.

Expansion of the 120-kv transmission system will require the construction of approximately 40 miles of additional supply lines and a 30,000-kva substation.

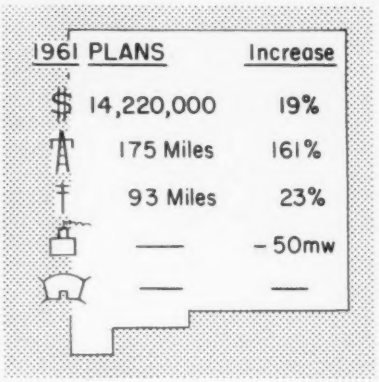
Four new substations for a total of 12,500 kva will be added to the distribution system, three being located at Reno and one at Carson City in a continuing effort to keep ahead of the load growth. M. H. ATCHESON, *vice president in charge of engineering.*

These 15-story structures mark the Arizona Public Service Co.'s Ocotillo plant near Tempe. The 220,000-kw station generates more electric power than the state used in 1942



New Mexico

Public Service Will Build First Tie To Four Corners Area



PUBLIC SERVICE OF NEW MEXICO

Public Service Co. of New Mexico has budgeted more than $13 million for construction during 1961. One of the major projects will be the first full year of construction on the No. 3 unit at Reeves station scheduled for 1960 completion. The company will also build its first 230-kv transmission line, from Albuquerque to uranium mine and mill customers at Ambrosia Lake, 70 miles west of Albuquerque. The 230-kv line will be operated initially at 115 kv to form a loop with an existing 115-kv line now serving those customers. The 230-kv line is the first link of a line that will connect the company's system with the Four Corners area of New Mexico and provide interconnection with other utilities in the area, and with the Colorado River storage project.

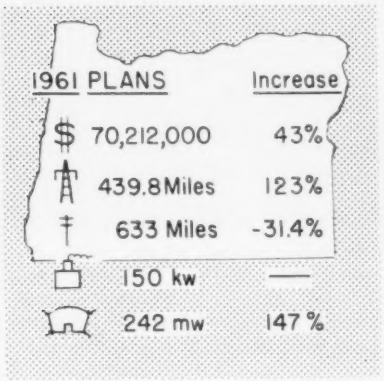
With a population growth of 30.6% estimated for the State of New Mexico over the next 10 years, compared with 16.8% forecast nationally, the company expects its load growth to surpass the national average. A five-year estimate of expansion completed recently indicates a construction program of at least $60 million in the years 1961 through 1965.

CALIFORNIA OREGON POWER

Construction will continue through 1961 on the Iron Gate development, with completion of the earth-filled dam, power house, penstock and fish facilities expected in December.

Oregon

Construction Active As Budgets Go Up 43%. Transmission Booms



Other major construction will include the installation of 30,000 kvar of automatically switched capacitors in the Lone Pine substation near Medford, Ore.; installation of a 125/4-kv, 10,000-kva substation at Yamsay, Ore.; construction of 34 miles of 125-kv transmission line from Chiloquin to Yamsay, Ore.; and installation of an oil circuit breaker and associated bus work in the Chiloquin substation. Twenty-seven miles of 66-kv line in various locations on the system and two new distribution substations, along with continued expansion of the distribution system and general plant, are also planned.—J. C. BOYLE, *vice president and general manager.*

CENTRAL LINCOLN PUD

The 1961 construction program will involve approximately $1 million and will result in net additions to plant of approximately $750,000. The program includes the completion of two minor extensions to the 69,000-v transmission system and the installation of two new 69,000-7,200/12,470-v, 5,000-kva substations, installation of additional bus voltage regulating equipment in substations at Mapleton and Reedsport; construction of additional 12,000-v feeders at various locations on the system for increased system capacity; completion of a $120,000 warehouse and office building at South Beach near Newport; and construction of a new local office building at Toledo, Ore.—L. J. BAUER, *general manager.*

EUGENE WATER & ELECTRIC BOARD

The main construction now under way is the Carmen-Smith hydroelectric project on the Upper McKenzie River. This project consists of two dams, two tunnels, one power house having two 40,000-kw turbines and one power house having one 10,000-kw unit. The project is scheduled for energization on Oct. 1, 1962. —RALPH W. MARTIN JR., *chief engineer.*

PACIFIC POWER & LIGHT

Expansion of its transmission system and extensions of distribution facilities represent the larger portion of $28,600,000 of construction budgeted for 1961 by Pacific Power & Light Co., Portland, Ore.

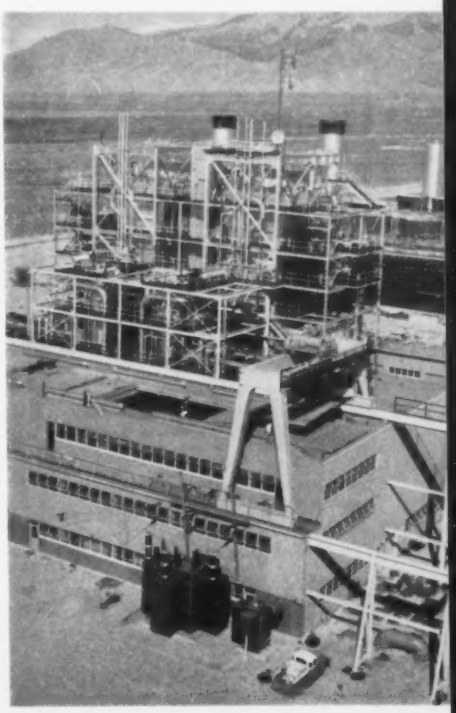
A major transmission project in Washington and Idaho will be $2 million for half of a 230-kv line from Lewiston, Idaho, to Walla Walla, Wash., and a substation at Walla Walla. The other half of the line will be built by Washington Water Power with terminal substation installation at Lewiston, Idaho. The line will deliver power from the Snake River developments, pending completion of the Wanapum development on the Columbia River, at which time the circuit will be completed from Walla Walla to the Wanapum power house.

The largest portion of PP&L's $11 million transmission budget will be in Wyoming, where a 230-kv line from Casper to Riverton and an extension another 52 miles from Riverton to Atlantic City are scheduled. The U.S. Steel Corp. has a large taconite project under development at Atlantic City. Modernization and extension of the distribution system calls for an outlay of $13 million during the year.

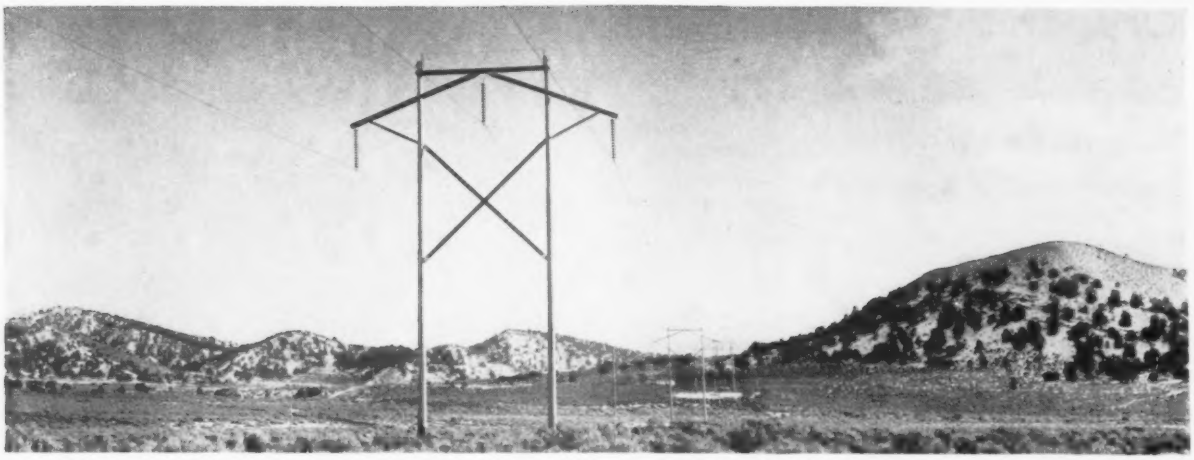
PORTLAND GENERAL ELECTRIC

Expenditures for new transmission, distribution and general system improvements will amount to $16,063,000 in the coming year. Also budgeted is a tentative allocation of $6,900,000 to start construction of the 300,000-kva Round Butte hydroelectric project on the Deschutes River. The latter funds will be made available when final approval of the project is secured.

Construction of the high voltage transmission overlay continues with the addition of a 48-mile, 230-kv line connecting the cities of Salem and Portland, with an intermediate substation at Oregon City. The three substations and the construction of the line require $3,900,000 of the 1961 budgeted funds. The terminal at Portland will include a 250,000-kva, 230/115-kv, three-phase, load-tap-changing autotransformer which will be the largest single unit yet shipped to the Northwest.



Above right, one of two tunnels on Eugene Water & Electric's Carmen-Smith project. PS of New Mexico completed two 44,000-kw units at Reeves station (right) in 1960



Utah P&L completed this 65-mile portion of its 230-kv line in early 1960 — the first such high-voltage line in the area

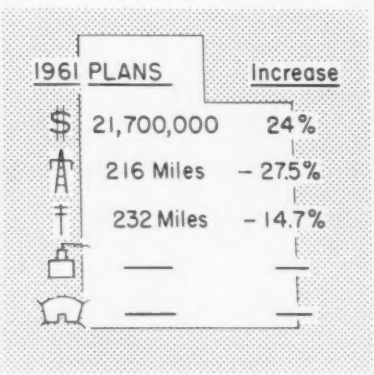
The balance of the transmission program consists of the completion of two major 115-kv transmission links and the beefing up of 57-kv lines to meet the demands of increasing load. One new major substation will be required in this phase of the program.

Four new distribution substations are planned for construction during the year, adding 36,000 kva of capacity to the distribution system. Capacity increases at five existing stations will add another 50,000 kva to the system.

A new $400,000 service center for the Gresham Division is planned for 1961 construction. This facility will house the general offices, line department and shops for this division 15 miles east of Portland. — W. D. SMITH, *chief planning engineer.*

Utah

UP & L Starting Work On Kemmerer Plant To Burn Strip Mine Coal



UTAH POWER & LIGHT

Utah Power & Light Co. and its subsidiaries have budgeted $21.7 million for construction expenditures in 1961 as compared to $17.5 million expended in 1960.

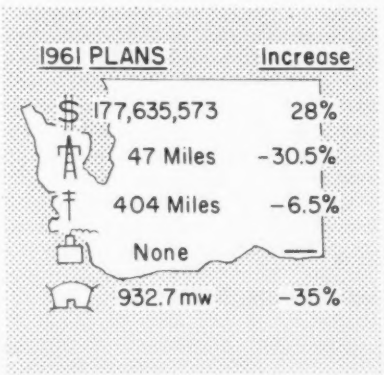
Our planned expenditures of $3.8 million for generation include $3.5 million for initial construction work at plant site of our Kemmerer, Wyo., steam-electric project. The in-service date of the first 150,000-kw unit is scheduled for October 1963. This development is for an ultimate 500,000 kw and will be designed to burn subbituminous strip mine coal.

Planned transmission expenditures of $8.5 million include the construction of 66 miles of 230,000-v line extending from the Idaho Power Co. system at American Falls, Idaho, to the Oneida plant of the Utah Power & Light Co. This line will greatly increase the capacity between the two systems and allow a larger interchange of power.

Improvement to distribution facilities and extensions to serve new customers in 1961 are estimated at a cost of $8.2 million for the year. D. L. BRYNER, *staff engineer.*

Washington

Rocky Reach Will Add 750,000 Kw. State Budgets Going Up 28%



Seattle City Light's six new substations are designed to blend with the surrounding area

CHELAN COUNTY PUD

Bringing into production of all seven generating units at Rocky Reach Dam will be a primary goal of Chelan County PUD during 1961. The project is now around 90% complete and beneficial production of power is slated to begin sometime in June.

One or more generators will be ready to roll in June and the balance of the initial installation of seven units is due for completion by Nov. 1. This is approximately six months ahead of the original schedule.

Major work to be done during the year on Rocky Reach will include construction of a 230-kv transmission line from the dam to Bonneville Power Administration's Columbia substation, a distance of about 22 miles. This will supplement other power lines leading from the project.

CLARK COUNTY PUD

In 1961 the district will build new dispatching headquarters to modernize and improve this phase of our operations. The system will be expanded to serve added loads. Our plans call for increasing conductor sizes on approximately 10 miles of line, installing regulators at various locations and converting some of the remaining 2.4-kv distribution to 12.45 kv.—FRED H. LEHMAN, *chief engineer.*

GRANT COUNTY PUD

It is expected that by Sept. 21, 1961, Priest Rapids Dam wil be complete and its 10 generators will be turning out their full name-plate rating of 788,500 kw.

Wanapum Dam is approximately 27% complete. By the end of 1961 it is expected that the Wanapum power house will be virtually complete and installation of generating units will be under way. The right and left bank fish facilities also will be nearing completion. Wanapum is scheduled for completion by the end of 1964. Filling of the Wanapum reservoir will start during the high water season of 1963. When completed, Wanapum's 10 generators will have a total name-plate capacity of 831,250 kw.

One of the highlights of 1960 was the notification last spring that the Public Utility District of Grant County had been given the Scattergood Award as one of the three outstanding electric utilities in the United States.—HERB JENKINS.

GRAYS HARBOR COUNTY PUD

Our 1961 construction budget includes the completion of two new distribution substations and the expansion of two existing distribution substations, work that was started under the 1960 program to take care of load growth. This work, combined with construction of approximately 25 miles of 69-kv transmission circuit, is part of the program of converting our 23-kv subtransmission system to 69-kv operation. The Aberdeen point of delivery for Bonneville power at 69 kv was completed in January 1691, and the PUD facility designated for switching this power is scheduled for early completion. Associated with this work is planning for a 115-kv to 69-kv transmission substation to provide a source of 69-kv power at Cosmopolis.

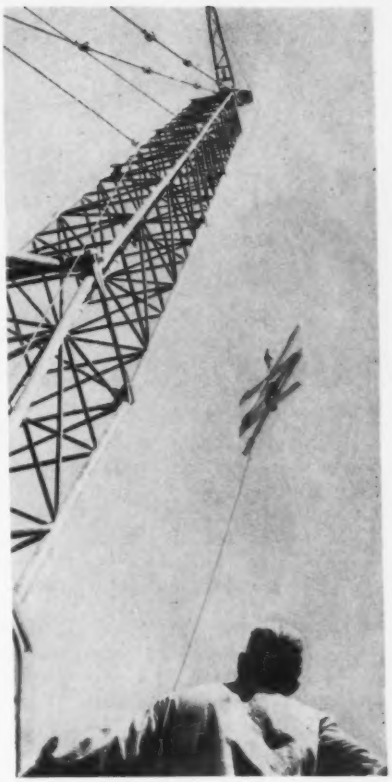
Rebuilding various distribution circuits for additional capacity and converting distribution voltage from 4 kv to 12 kv in two areas completes the major portion of our construction plans for 1961.—D. W. LAUCKHART, *general superintendent.*

SEATTLE CITY LIGHT

The following resume outlines construction activities that will be continued or started in 1961:

Installation of new turbine runners and associated modifications of equipment was completed on three of the four generating units at the Gorge power house during 1960. The conversion of the fourth unit will be accomplished during 1961. All principal items of the Gorge High Dam will be completed by the end of 1960, making possible high head operation of the converted generating units.

Federal Power Commission hearings on the city's application for license to construct the proposed Boundary project on the Pend Oreille River have been completed. Contingent upon the granting of a construction license, and the terms thereof, we will proceed with final engineering and possibly commence construction during 1961.



Going up! Tall boom raises final cage section into place atop the 194-ft east tower of Portland General Electric's new Willamette River crossing. Towers will support two heavy 115-kv circuits, providing an effective tie between Portland's east and west sides. View at right shows workmen removing the scaffolding from the diversion intake structure of the California Oregon Power Co.'s Iron Gate development of the Klamath Basin project

Diamond drilling at potential power sites will be undertaken in 1961, continuing a program of survey and investigation.

Reconstruction of the crib dam at our Cedar Falls plant is contemplated at a convenient time during the year.

Service facilities at the Skagit development will be greatly improved by the construction of a new Skagit Service Center at Newhalem. This center will consist of a 27,000-sq-ft building to house shops, stores and camp office. Also provided will be ample yard area for outside storage and vehicle parking.

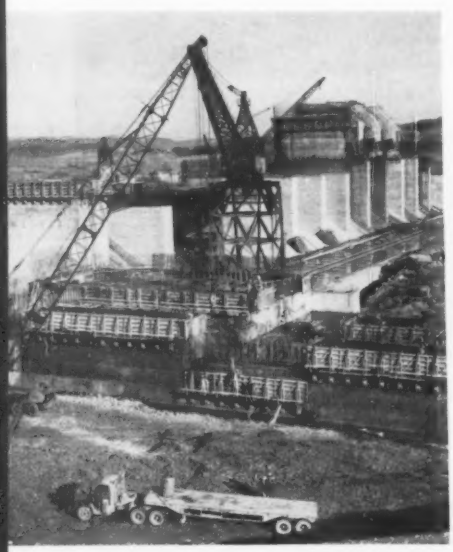
Acquisition of right-of-way continues and construction of the 230-kv Maple Valley-Tukwila-Duwamish transmission line will probably start in 1961. This line will tie our future Tukwila and existing Duwamish substation to the Bonneville Power Maple Valley substation.

Extension of 115-kv lines to connect major receiving and distribution substations in the north end of Seattle is scheduled for 1961. This project should complete the present program for the north end 115-kv network.

Items of construction under our continual program of expanding and improving our distribution system are the installation of unit substations and modifications to others, thereby adding 35,000 kva of capacity; additional primary and secondary circuits; transformers, services and meters; reactive requirements; and relocation work necessitated by the Tacoma-Everett freeway.

A special effort is being made to advise our customers of the cost and means of financing underground distribution systems in residential areas, and to convert from overhead where load density justifies the cost as continuing part of a comprehensive program initiated in 1960.

A major project scheduled for 1961 involves the remodeling of the sales floor area in the City Light Building to provide adequate air distribution and lighting. It will also provide office spaces adjacent to the sales floor for commercial consultants.—H. V. STRANDBERG, *chief engineer.*



Helicopters were used to carry power lines across canyons of the Snake River (top) when WWP and Idaho Power made their 230-kv interconnection. At year-end Grant County PUD's Wanapum Dam, started July 1959, was approximately 40% completed

SKAGIT COUNTY PUD

The PUD plans to spend more than $1 million in 1961 for improvements which are expected "to alleviate the future critical water supply situation," faced by the Skagit County Public Utility District. The situation was predicted in a recent survey by R. W. Beck & Associates, Seattle utility analysts and engineers.

The major improvement under study is a proposed $935,000 transmission line from Judy reservoir, east of Clear Lake, to Mount Vernon. Installation of the line in time for 1962 peak summer water demands is one of two solutions suggested by Beck for predicted water supply shortage.

Financing the Judy line, requiring a $1 million bond issue, would necessitate a 13.5% rate increase to nearly all PUD customers, Beck estimates.

Fred Orvernell, PUD manager, said the proposed Judy reservoir line would raise the capacity to 16½ million gal of water daily, by gravity alone. With booster pumping, the line would raise the capacity to 19 million gal per day.

SNOHOMISH COUNTY PUD

The industrial and economic future of Snohomish County is bright.

The district budgeted $12,121,792 to be expended in 1961. The total electric construction budget is $3,817,375. The major items are completion of the Lake Stevens to Monroe transmission line, $108,000; a 10,000-kva mobile substation, $150,000; Snohomish substation No. 2 conversion, $150,000; a new substation and connecting lines to be located north and west of Marysville, $318,000; and a new substation to be located in the Silver Lake area, $90,000. A new office is planned for Edmonds, $95,000, and Everett substation additions, $85,000. A total of $2,075,000 was allocated for meters and installation, transformers and installation, added load, new business and line extensions for tools, automotive, laboratory, radio equipment and office furniture, $199,675.—A. S. J. STEELE, *manager.*

WASHINGTON WATER POWER

As 1960 drew to a close the Washington Water Power Co. was completing a decade of expansion that added approximately 630,000 kw of generating capacity to the company's all-hydroelectric system and increased its plant account from $80

million to approximately $280 million.

Provided agreement can be reached with the U.S. Forest Service, WWP will spend approximately $171,000 to complete the Elk City-Grangeville, Idaho, electric line and substation. Completion of this line will bring electric service to one of the few remaining areas in the Pacific Northwest still unserved. The 50-mile line will pass through one of the most primitive areas in the United States.

The company has budgeted $305,000 to complete an improvement program on its Clarkston water system in Clarkston, Wash. The money will be used to complete a fifth and sixth well, to construct a $96,000 pumphouse on the Snake River and to install pumps in the new wells.

WWP entered the natural gas business in mid-1958. Because of the rapidly growing use of this new fuel, the company has budgeted $1,354,890 for main extensions throughout its growing gas distribution system for 1961.

WWP will spend $187,000 to modernize its Little Falls hydroelectric plant on the Spokane River, 14 miles north of Reardan, Wash. Built in 1910, Little Falls has four units, each with a name-plate rating of 8,000 kw. —ALLAN F. ELDER, *treasurer*.

Wyoming

CHEYENNE LIGHT, FUEL & POWER

This company will carry out one of its most extensive construction programs in history during 1961.

The total program for building new gas, electric and service facilities is estimated to cost $1.75 million.

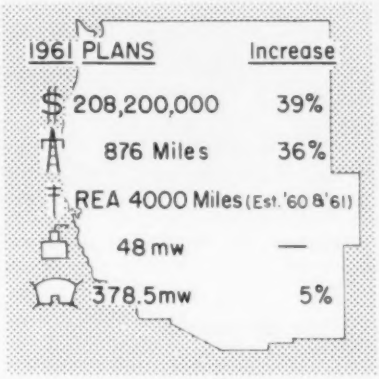
A major electrical system addition will be the installation of another 25,000-kva transformer at the company's 115-kv substation southwest of Cheyenne, bringing the capacity of this station up to 50,000 kva.

Two additional main feeder circuits and control switchgear will be completed to deliver power from the substation into the company's electric system. Other electrical system extensions and improvements necessary to meet increased demand are also provided for under the expansion program.

A new service center will be built in Cheyenne to house all electric, gas and steam heat operating personnel, together with automotive and construction equipment and a storeroom for supplies and materials.—PAUL E. BROOKOVER, *general manager*.

Federal

Corps of Engineers; Bureau of Reclamation; BPA; REA



CORPS OF ENGINEERS

Bruces Eddy Dam on the North Fork of the Clearwater River in northern Idaho has been allocated over $1,500,000 in planning funds by Congress the past three fiscal years. Under its tentative 10-year dam construction plan, Bruces Eddy has a schedule, if started in 1963, of being completed by 1969. Cost of Bruces Eddy Dam is estimated at $160 million.

Little Goose Lock and Dam, the third of four approved multipurpose dams on the Snake River between its confluence with the Columbia and Lewiston, Idaho, has been allocated a $550,000 preconstruction planning fund. Like Lower Monumental Lock and Dam, Little Goose is designed to be approximately 100 ft high, primarily for navigation and power generation. Little Goose is designed as a $130 million project and its construction life under the 10-year Corps of Engineers' plan is rated from 1963 to 1968.

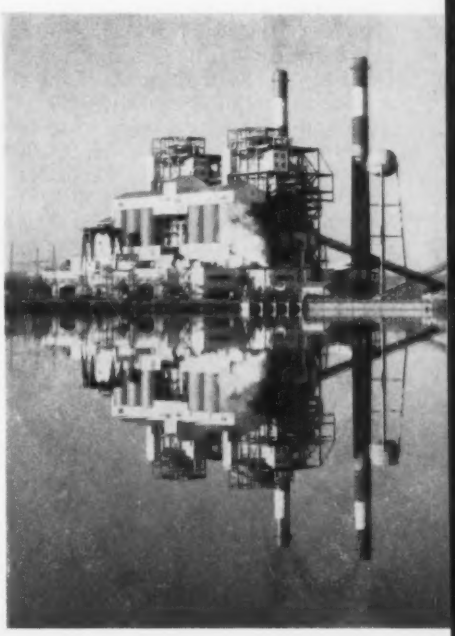
Lower Monumental Lock and Dam on the Snake River was allocated in the 1961 fiscal year $1,000,000 in construction funds by Congress. Work on this new start should get under way before the close of the fiscal year, June 30, 1961. The first contract to be let will be for north and south shore access roads and the south shore cofferdam. Lower Monumental is designed as a $150 million project and, with continuing funds made available, has a construction schedule calling for completion by 1967. The three initial generators will have a capacity of 121,000 kw each. The design also calls for three additional skeleton units to provide an ultimate power production capability of 726,000 kw.

At **Ice Harbor Lock and Dam,** on the Snake River, the $7,443,377 power-house contract is rated as 89.8% complete. Contractors have set two of the turbine runners and installation of intake gate cylinders in skeleton units is completed. The $194,370 foundation drilling and grouting contract is rated at 78.9% complete. Within the north shore cofferdam work area, the $21,053,382 contract is 90% complete. More than 598,000 cu yd of concrete have been placed to date and the monoliths topped out. Continued pouring of the upper sill block to approximately 365-ft elevation continues.

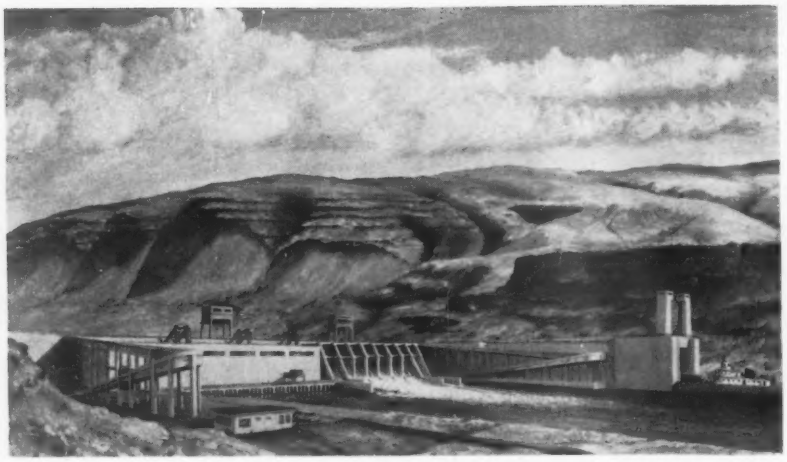
Nine relocations contracts are in effect at Ice Harbor Lock and Dam, covering relocation of the Union Pacific on the south shore and the Northern Pacific and SP&S railways on the north shore.

Twelve supply contracts are in effect, covering equipment facilities, switchboards, switchgear, motor control centers and kv equipment at the Ice Harbor Dam project.

Ice Harbor, rated at a $123 million cost, is scheduled for power on the line by late December of 1961.



A second unit was added to Pacific Power & Light's Dave Johnston steam plant in December 1960, making it the largest thermal electric power station in Wyoming



Artist's conception of Lower Monumental lock and dam on the Snake River. Investment for initial construction of this project is estimated at $150 million by Corps of Engineers

with the raising of the Ice Harbor pool behind the dam to take place at that time. At the close of 1960, the project was running ahead of construction schedule.

As of Jan. 1, 1961, 12 construction contracts are in effect at the **John Day Dam** site on the Columbia River. Principal construction contract is the $32.5 million north shore contract. The contractor has placed over a half million cubic yards of mass and structural concrete in the spillway, navigation lock, fishway and stilling basin area. Approximately 50% of the concrete quantity for spillway piers has been poured. John Day Lock and Dam is estimated at a $423 million cost.

The **Green Peter** project consists of Green Peter reservoir and Foster reservoir, a multipurpose development of the water resources of the Willamette Basin. Green Peter, on the Middle Fork of the Santiam, will have an installed capacity of 90,000 kw and will require 5½ years to construct. Estimated cost is $54,900,000. Foster Dam, located downstream from Green Peter on the South Santiam, will have a capacity of 30,000 kw and will cost $17,400,000.

Construction of **Cougar Dam** on the South Fork of the McKenzie River began in the summer of 1956. Power on the line is expected in November of 1962. The power plant will consist of two 12,500-kw units with provisions for a future unit rated at 35,000 kw.

Hills Creek Project, located on the Middle Fork of the Willamette River, will go on the line in the fall of 1961, making 30,000 kw of additional capacity available. Construction work was started in April 1956 when a contract was let to build the diversion tunnel.

BONNEVILLE POWER ADMINISTRATION

Bonneville Power Administration plans a $19 million construction program for calendar year 1961 compared to expenditures of $20,500,000 in 1960, with contract construction work estimated at about $4,450,000 as compared to $6,285,000 for 1960.

Contracts proposed for the coming year include 96 miles of right-of-way clearing at an estimated cost of $460,000, 78 miles of transmission line construction, $1,900,000, and 24 substations or substation additions totaling $2 million. Final contract expenditures for the latter half of the calendar year will be dependent upon congressional appropriations.

Right-of-way clearing contracts and month of issuance for 1961:

February: Five miles of 100-ft right-of-way for Hills Creek-Oakridge 115,000-v transmission line; March: nine miles of 100-ft right-of-way for Cougar-EWEB station S 115,000-v line, Cougar-Finn Rock section; and April: 18 miles of 100-ft right-of-way for the Leaburg-EWEB station S section of the Cougar-EWEB S 115,000-v line.

Proposed line construction contracts include: December 1960: Big Eddy-Parkdale and Sandy-McLoughlin sections, 23 and 19 miles, respectively, of the Big Eddy-McLoughlin 345,000-v transmission line; March 1961: the 14-mile Tacoma-Covington 287,000-v transmission line No. 3 and four miles of the Lexington 115,000-v loop to the Chehalis-Longview transmission line; April: eight miles of line changes at the Franklin substation for the Ice Harbor line; May: the five-mile Hills Creek-Oakridge 115,000-v transmission line and substation additions and Rocky Reach-Maple Valley transmission line patrol shelters; June: five-mile Silver Creek-Mossy Rock 69,000-v transmission line relocation and Silver Creek-Mayfield extension and control cable.

Substations and substation addition contracts include: December 1960: J. D. Ross substation storage buildings and Tacoma substation line terminals; February 1961: Fossil 69,000-v switching station, Lexington 115,000-v switching station and miscellaneous grading at J. D. Ross substation; March: Big Eddy substation entrance road paving, Alvey substation warehouse extension, Bell substation control house roofing, Longview and Olympia substation entrance road paving and Ross substation building reroofing; April: Ross substation DOB building siding, Wren substation transformer and feeder additions, Fern Ridge new 115,000 to 12,500-v substation; May: Redmond substation transformer and terminal additions, Franklin substation 115,000-v Ice Harbor terminals 1 and 2, Gold Beach substation 115,000-v line terminal addition; June: Bandon substation 115,000-v terminal, Ross substation service center site development and new warehouse building; July: Ross substation service center drainage sewer and water mains and sewage disposal plant, Hampton 115,000-v new substation; and October: Eastmont 115,000-v new substation.—WILBUR D. STAATS, *information officer.*

BUREAU OF RECLAMATION

• The contract for furnishing and installing the 95,000-kw generator for Unit N-8 of the project's Hoover power plant is about 50% completed. Installation of the generator, scheduled to be completed in July 1961, will bring the plant to its full capacity of 1,344,800 kw. Manufacture of the hydraulic turbine for Unit N-8 is about 90% completed. The turbine is of the vertical-shaft, Francis type, and has a capacity of 115,000 hp and will operate under a 480-ft head. The turbine will be installed under a separate contract.

• Invitations to bid on manufacture of the eight 112,500-kw generators for the Glen Canyon power plant are expected to be issued in February. The generators will be the largest in capacity to be installed on a Bureau of Reclamation project. They are to be rated as 125,000 kva, 90% power factor, 150 rpm, 13,800, v, 60 cycle, vertical shaft, a-c generators. The contract for manufacture

of the plant's eight 155,500-hp hydraulic turbines, awarded in April 1960, is about 5% completed.

The 900,000-kw Glen Canyon power plant is under construction at the toe of the 710-ft-high concrete-arch Glen Canyon Dam on the Colorado River, 12 river miles downstream from the Arizona-Utah state line. The plant will be the bureau's third largest in installed capacity, exceeded only by the Grand Coulee and Hoover power plants. The contract for construction of the dam and power plant is about 36% completed.

In January contractors will be invited to bid on construction of steel towers for the first section of a transmission line to extend from Glen Canyon power plant to the Storage Project's Curecanti Unit in western Colorado. This will be a 230-kv, 163-mile section extending from Glen Canyon power plant to a point near Shiprock in northwestern New Mexico. The second leg of the line will be under construction by next fall. Construction of both sections of the line is scheduled for completion by February 1964.

● Construction of the Flaming Gorge Dam and power plant is about 35% completed. The dam and power plant, major features of the storage project, are on the Green River in northeastern Utah, about 6 miles south of the Utah-Wyoming state line. The 108,000-kw power plant under construction at the toe of the 490-ft-high concrete-arch dam will have three 36,000-kw generating units. The contract for manufacture of the plant's three 50,000-hp hydraulic turbines is about 5% completed.

Invitations calling for construction of a transmission line between Flaming Gorge power plant and Oak Creek, Colo., were issued last December. The line, which is to consist of 85 miles of 138-kv and 115 miles of 115-kv capacities, will connect with an existing 115-kv line between Oak Creek and Kremmling, Colo. By construction of a short 115-kv line between Kremmling and Green Mountain power plant in Colorado, an interchange of power will be made possible between Flaming Gorge power plant and the transmission system of the Bureau's Colorado-Big Thompson Project.

Bids are expected to be invited in April for completion work for the Flaming Gorge power plant, which will consist of constructing a switchyard, installing the three turbines and three generators, transformer bank and other electrical and mechanical equipment, and applying architectural finishes and installing architectural features.

● Three power plants on the project's Trinity River Division in northern California are in early stages of construction. They are: Spring Creek, 150,000 kw; Clear Creek, 134,000 kw; and Trinity, 100,000 kw. Spring Creek power plant will have two 75,000-kw generating units driven by two 105,000-hp hydraulic turbines. Clear Creek power plant will house two 67,000-kw generating units driven by two 93,500-hp hydraulic turbines. The Trinity plant will have two 50,000-kw generating units. There are to be two interchangeable runners for each hydraulic turbine, one rated 85,000-hp at 426-ft head and one rated 70,000-hp at 334-ft head.

Bids were opened late in December 1960 for construction of the division's Lewiston Dam, a 300,000-cu-yd earthfill structure, and the 300-kw Lewiston power plant. Invitations were expected to be issued late in January calling for manufacture of the plant's single 500-hp turbine.

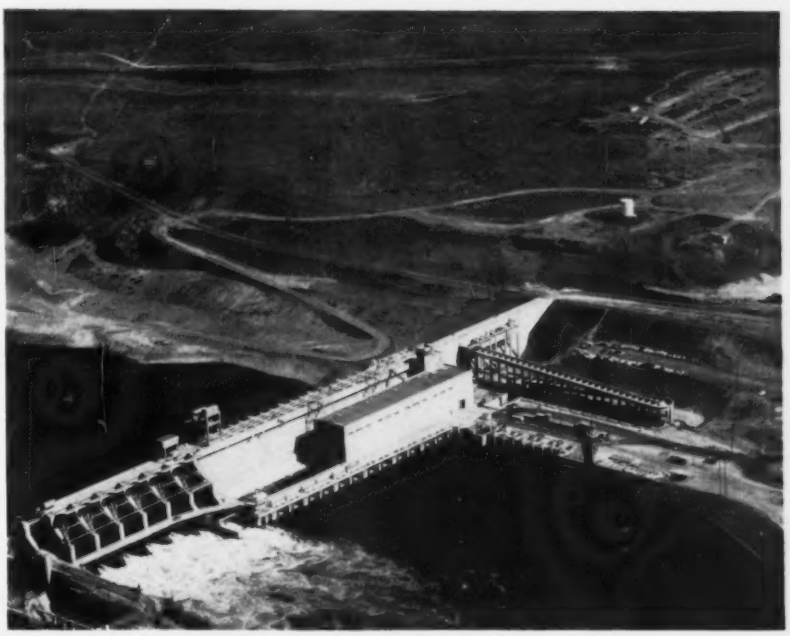
Invitations are to be issued in May for construction of a total of 28 miles of 230-kv transmission lines connecting Trinity and Clear Creek power plants (14 miles), Clear Creek and Keswick power plants (12 miles), and Spring Creek and Keswick power plants (2 miles). Keswick power plant is an existing 75,000-kw installation completed by the Bureau of Reclamation on the Central Valley Project in 1949.

● Construction of the project's Upper and Lower Molina power plants, 7 miles of steel penstocks and an equalizing reservoir, is about 75% completed. The work is located about 40 miles east of Grand Junction in western Colorado. The Upper Molina power plant will have a single 8,640-kw generating unit and will operate under a maximum head of about 2,400 ft. The Lower Molina power plant will have a single 4,860-kw generating unit and will operate under a maximum head of about 1,300 ft. The contract for manufacture of the hydraulic turbines for the two plants is about 85% completed, and the contract for manufacture of the two generators is about 35% completed.

Invitations were issued in December 1960, and bids will be opened in March 1961, for completion of construction of the Upper and Lower Molina power plants and switchyards, including the installation of turbines, generators and associated plant equipment.

● Construction is expected to start by late spring on Yellowtail Dam and power plant, major features of the project's Yellowtail Unit, on the Big Horn River, about 45 miles southwest of Hardin, Mont. The concrete-arch dam will be 520 ft high above foundation, 1,450 ft long at the crest, and will have a volume of 1,660,000 cu yd. The 200,000-kw

At Ice Harbor Dam, the Corps of Engineers project on the Snake, nine relocation contracts are in effect covering the Union Pacific, Northern Pacific and SP&S railways



Yellowtail power plant will have four 50,000-kw generating units.

RURAL ELECTRIFICATION ADMINISTRATION

During calendar year 1960, REA approved a total of $34,092,000 in loans to electrification borrowers in the 13 Western states. The loans will enable the borrowers to provide electric service to an estimated 9,450 new rural consumers, and to add approximately 4,000 miles of line to their systems. They also provide for an additional 48,036 kw of generating capacity and extensive system improvements.

The 1960 lending activity brought to $595,393,690 the cumulative total of loans approved to active REA borrowers in this section of the country. Loans to all borrowers total $602,842,731.

The 153 REA-financed electric systems in operation in the Western states were serving a total of 400,144 consumers over 146,294 miles of line on Oct. 1, 1960. In addition, 19 former borrowers were providing service to 15,335 consumers over 4,142 miles of line by the time they had repaid their REA loans in full.

REA loans were approved to two new electrification borrowers during 1960. One of these new borrowers is located in the Western area. It is. Kenai Lake Electric Cooperative Inc., Moose Pass, Alaska.

Canada

Site Work Continues On $638 Million Peace River Project

B. C. ELECTRIC

It is estimated that during 1961 $39,500,000 will be spent so that new generating, transmission and distribution facilities can be provided. The 1960 annual maximum one-hour peak demand of 817,000 kw was reached in December and during the year approximately 3,500,000,000 kwh of energy were sold. The total installed generating capacity by the end of the year amounted to 1,092,700 kw.

About 10 miles from Vancouver city center, work continued during 1960 on the Burrard thermal generating station named for Burrard Inlet, on which it is located. Satisfactory progress has been made on this installation and it is expected that the first turbogenerator set rated at 150,000 kw will be placed in commercial service early in 1962. The turboelectric sets to be installed will be three-cylinder tandem coupled reheat condensing turbines rated at 1,800 psi, 1,000 F. Boilers are designed to provide tangential firing, using 16 burners when oil is burned or 32 burners when natural gas is the fuel. Cooling water for each condenser will be supplied by pumping sea water at the rate of 64,000 imperial gpm from Burrard Inlet adjacent to the plant. Each generator will have a maximum continuous rating of 180,000 kva, 90% power factor, 16.5 kv and is designed to operate at 3,600 rpm with cooling provided by hydrogen gas at 30 psi. The initial plant output will be stepped up to 230,000 v through 175,000-kva transformers and will be transmitted over 5½ miles of double circuit transmission line into the existing 230-kv urban network. Work on this double circuit transmission line is well in hand and is expected to be completed early in 1961.

CALGARY POWER

In 1960 construction commenced on a third unit of 200,000 hp capacity at the Wabamun steam station. This plant is currently using natural gas but by 1963 will burn coal as its main fuel from a large reserve of strippable coal nearby. Overburden from the coal seams will be removed by a huge electrically operated dragline currently being manufactured in Great Britain. The erection of this dragline at Wabamun is scheduled to begin during 1961. Preparation of the coal field and work on the extension to the plant will continue throughout 1961 in preparation for the commissioning of the new unit in 1962.

The Brazeau River site is being developed for its storage potential. Calgary Power is engineering and constructing the dam and water-control facilities on behalf of the government of Alberta in order to alleviate, as soon as possible, the water pollution problem on the North Saskatchewan River. Some water will be available to increase the low water flow in the North Saskatchewan next winter and a full reservoir of 275,000 acre-ft will be available for the following winter of 1962-63.

The demand for electric service continued strong in 1960 despite a drop in residential construction in the Province. Industry continued to establish and expand in Alberta based on a growing market in western Canada and low cost energy and raw materials. It is expected that in 1961 the Province's electric load will continue to increase, although at a somewhat lower rate than has occurred over the past 10 years.

DISTRIBUTION OF 1960 REA LOANS

State	Amount
Alaska	$2,180,000
Arizona	491,000
California	1,446,000
Colorado	13,153,000
Hawaii	
Idaho	1,363,000
Montana	2,380,000
Nevada	100,000
New Mexico	5,124,000
Oregon	2,927,000
Utah	748,000
Washington	2,335,000
Wyoming	1,845,000

PEACE RIVER POWER

Our position at present is as follows:

Plans for construction remain unchanged from those submitted to the B.C. government in December 1959. Thus, we expect to commence heavy construction in the spring of 1962.

With regard to 1961, we are presently engaged in collecting the data required in support of applications to the Public Utilities Commission and the Water Rights Department for a Certificate of Public Convenience and Necessity and a Water License, respectively. One of the major outstanding items in this respect is the compilation of details of title to all privately owned land in the reservoir area. Although the total amount of privately owned land is extremely small, the complete reservoir area has had to be searched exhaustively and the present owners of each privately owned lot located. As the reservoir area is considerably in excess of one-half million acres, the magnitude of this task can easily be seen. However, we anticipate receiving a complete report from our lawyers by the end of March 1961.

A certain amount of preliminary site work is planned for 1961 in preparation for construction in 1962.

With respect to amounts of money to be expended over the next few years, we refer to our ultimate total cost. The estimates included in the report submitted to the B.C. government in December 1959 totaled $638 million for the complete project. This amount includes the cost of two dams, power houses and associated transmission lines, which would generate first power in 1968 and reach ultimate capacity of 3,145 mw by 1976.—F. J. PINE.

Encapsulated Transformer Report

Continued from Page 53

The installation requires an open tank with the top set just at the surface of the ground. The relatively small transformer (about the size of a briefcase) is placed in the tank. High- and low-voltage cables are connected through sealed connectors in a grounded sheath. The low-voltage circuit goes from the transformer out of the tank and again underground into the home basement where it is connected to an entrance switch.

The open tank is then filled with thermal sand. The power supply is safe and completely out of sight. The installation can be water cooled economically by connection to the house water supply (presumedly by a controlled leak, which will keep the sand moist, increasing conductivity). It has tremendous heat-absorbing ability and can carry extreme peaks of load.

Pennsylvania Transformer

Pennsylvania Transformer Division has also been experimenting with oilless, encapsulated transformers in distribution ratings. Results have been encouraging enough to indicate that such transformers eventually might replace oil-filled units on both overhead and underground systems. Greatly reduced weight and size, with consequent savings in installation time and cost, are among the advantages that would result.

Recent Pennsylvania Transformer experimental units consist of a core-and-coil assembly encapsulated in modified epoxy. Encapsulation is accomplished by a vacuum pressure method. There is no tank and even the bushings are cast in place.

Tests conducted to date include impulse, heat cycling and weather exposure while under load.

RT&E

E. A. Link, vice president in charge of engineering, RT&E Corp., says, "the application of encapsulated transformers will raise new problems for both manufacturer and user. They must show savings in order to receive acceptance.

"This can only be obtained by drastically increasing the temperature rise in the transformer to the area of class F and working all of the materials harder.

"Our studies have been aided not only by the discovery of new materials but also by employing new methods of applying the material to transformer windings. Indications are that encapsulation of the transformer and removal of other high maintenance items is the future development direction in the distribution transformer industry."

Line Material

Line Material's A. R. Warner, director of transformer product sales, commented that "L-M has been developing encapsulated pole-tope distribution transformers for six years. Field trial units will be installed within 30 days in several kva and voltage ratings."

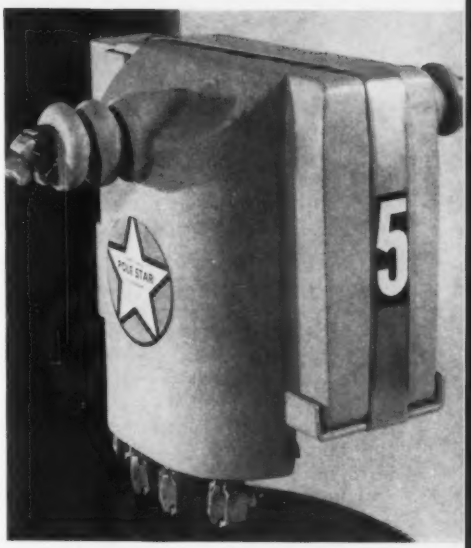
Savings Expected

The molded transformer indeed seems to have everything going for it. Beyond savings of tank cover, oil and bushings, there will be other savings. No oil ducting for cooling, no lead supports, no bracing against short circuits. The glop will do it. Indication is that in high production cost per kva should come down even though epoxy compounds and high temperature insulations are costly. Labor content should be radically cut. Stocking and freight costs should be reduced. Maintenance should be eliminated.

The one per house concept also suggests that transformer change-out be done by a trouble man as simply as a meter change. A one-man—10-minute job! Also built in is the plus that a transformer failure will offset a single house—a clear benefit over secondary schemes. Another built-in-solution—no requirement for higher secondary voltage. Biggest problem will be working with regulatory and safety groups to gain acceptance of the idea of bringing primary onto the user's premises.

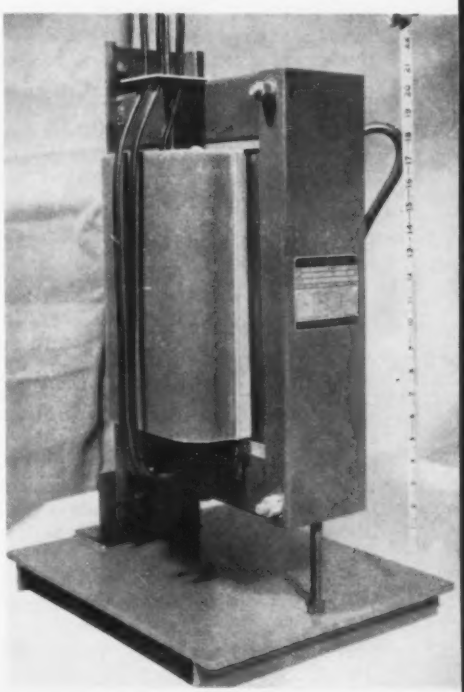
There appears to be no real problem of safely bringing distribution voltages from underground into a residence and arranging a primary plug socket that could be sealed and locked when not connected to the transformer. Noise is another problem that will have to be met. No manufacturer has given noise data. Presumably the placement of the transformer could isolate the sound from living areas.

Still needed before the industry can do a competent economic analysis are estimated high-volume-use prices. Initial handmade model prices will be understandably higher—and estimates of high-volume prices may be in error, but the industry has to know much more about the economic ball park before real progress can be made.



Size savings obtained through encapsulation is shown by this experimental transformer, designed and built by Pennsylvania Transformer. The kva identification "5" is 2.5 in. tall

The new G-E encapsulated unit weighs 25% less than conventional oil-type transformers, is 25% smaller and requires 40% to 50% less volume. Unit shown is 15 kva, and has a pint of oil in the high-voltage capsule



WORK MEASUREMENT

What it is. How it works. Why you should support it.

In recent years the electric utility industry has embarked on a new activity—work measurement.

The new emphasis arises from the realization on the part of utility management that technological improvements in the system could no longer offset the increase in costs of people and things and, at the same time, continue to reduce the cost of electricity to the consumer.

First target of the work measurement people has been clerical expenses which, in most businesses, tend to increase at three, even four, times the rate of production workers. In this area the work measurement adage "To measure is to improve" can be clearly seen. Working with clerical people and their supervisors the work measurement process begins. What are you doing? Is it absolutely necessary? Can someone else do it at lower cost? Is there a machine that can do it at less cost? And, finally, with the job reduced to its most efficient essentials, how many units can conscientiously be produced with reasonable effort during a normal work day? Using such straightforward methods, a large Eastern power utility reduced their work force by a thousand employees in a decade from 1950 to 1960 and at the same time doubled their installed capacity.

Suspicion

Work measurement activities are always viewed with suspicion, even distrust, on all sides. Unions are at first suspicious. But when unions are informed of the objectives, the suspicion vanishes and cooperation results. Working people fear that they will have to become subhuman in order to keep up to an artificially high standard. Biggest bugaboo perhaps is the seat-of-the-pants supervisor who feels that any method changes or increased productivity will reflect on his job as a manager.

Each of these fears in practice is unfounded. The only justifiable fears are on the part of any employee unwilling to give a day's effort or the supervisor unwilling to have his group work most efficiently.

Job Components

While still new to the power industry, the opportunities are exciting. One eastern utility has a complete operating division with its work measured against the time its employees put into the job. Work classifications are broken down into (1) productive work, (2) necessary but nonproductive (such as traveling to the job) and (3) nonproductive and unnecessary. Admittedly the nature of the human animal makes it impossible to expend 480 minutes a day in direct productive effort. But when the time in each of the three categories is set down there are few people who feel that there is enough productive time.

Another exciting area for work measurement is in the experimental study of utility construction processes. In this field construction people review their work in much the same vein that a professional football team reviews its performance on the gridiron. This kind of activity enabled an eastern utility to reduce the time required to install a pole, transformer and secondary drop from 650 man-minutes using a two-man digger crew and a four-man line crew to 324 man-minutes using a three-man line crew on a single truck with a digger attachment.

Results of Experimental Installation of Pole, Line Arm, Transformer and Service Drop

Average time allowed in Man-Minutes	
Under any condition	630
2-man digger crew and 4-man line crew at test site	584
3-man digger and 3-man line crew at test site	350
3-man line crew with digger on truck at test site	324

2:00—Crew's working foreman outlines job to three-man crew at site

2:08—Crew locates hole site, positions digger and digs hole

In the area of construction and maintenance activities work measurement within our industry is never reduced to the minuscule motion studies possible on a highly repetitive assembly operation (motion study experts say that there are at least seven distinct kinds of motion from the wrist to the work in hand). In the pole setting operation just described, the key to the improved methods came as a result of studying memo motion movies. The memo motion camera takes a frame every second. When reviewed it revealed two significant facts: (1) that during the complete operation, one of the members of the four-man crew could not be productive because his next task followed one which was currently being accomplished by another member of the crew; (2) the only requirement for four men all active at the same time came during the transformer lifting operation.

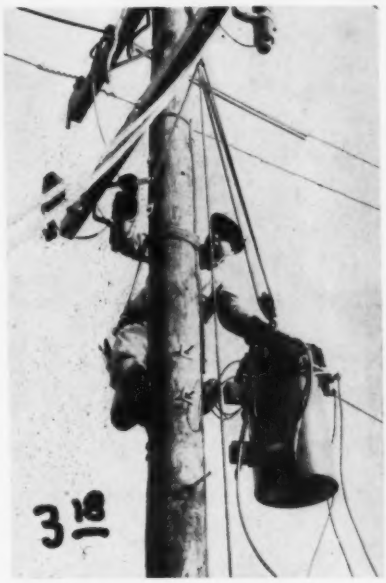
Out of this knowledge came the conclusion that a three-man crew could be more continuously productive if they could devise a method of hoisting the transformer that would be equally safe but would only require three men.

With some study and experimentation a method was devised for safely hoisting the transformer with three men.

Yet another very tangible benefit to come from work measurement is the ability to make rational decisions about the purchase of capital goods based on the knowledge of how annual savings will offset the capital

2:24—All hands turn to outfitting pole as completely as possible on the ground

2:34—Crew uses digger boom to hoist and set pole in hole. Elevated mechanism right of pole is memo motion camera



3:18—Transformer lift technique developed for three-man crew. Other men are on the winch and tag lines

3:12—After backfill and tamping, lineman mounts pole, secures primary. Other two men are laying out secondary termination

3:46—Once secondary is in place, both linemen work the pole, one on primary connections, one on secondary

3:48—Job's done!

investment. How soon can you afford a computer? What kind and size can you afford? How far can you go in the purchase of automatic line construction equipment? What manufacturer's design is best? Only with work measurement can an accurate answer be reached.

The Approach

There are two schools of thought on the approach of work measurements—each with advantages. The engineered approach carefully breaks any given task into components of man-minutes, the sum of which equals the total productive time theoretically required to accomplish a task. This particular approach has the advantage of creating maximum opportunity for the benefits of new methods to come into being. It has the disadvantage that many times the accuracy of the study far exceeds the accuracy of the reporting—and in some cases the cost of the work measurement exceeds any reasonable benefit that can be obtained.

A second approach—the comparative approach—goes to the other extreme and utilizes the minimum effort that can yield a comparative figure such as "meters read per meterman." In a situation where there are separate divisions, the pressure on the local management to bring the below-average district up to the average has a strong pressure to raise the whole performance within the company. But the means for improvement lie in the hands of the local supervisor who may or may not be able to make the best use of available new methods.

Can Improve 90%

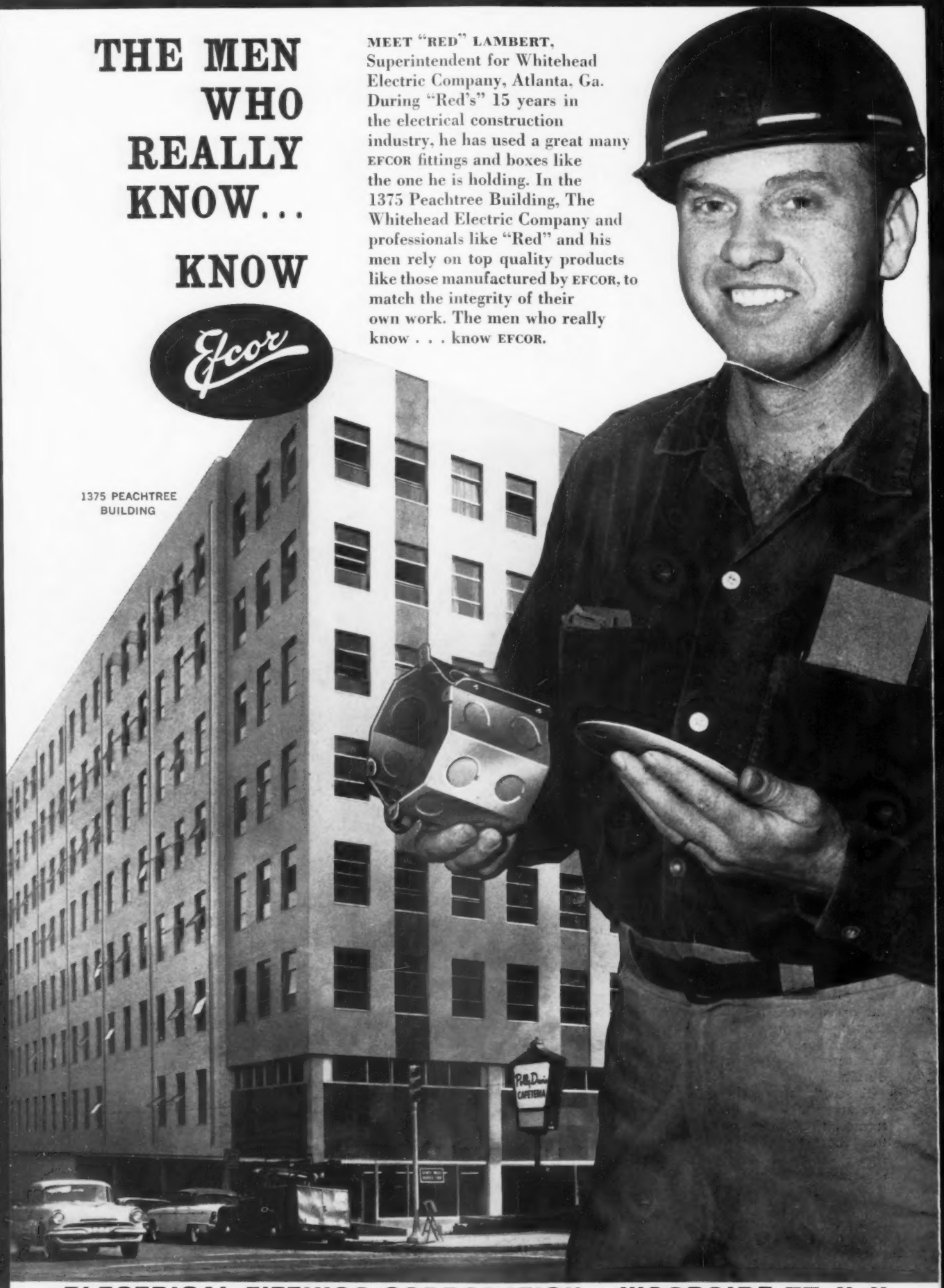
Somewhere between the engineered approach and the comparative approach is a work measurement technique that can improve 90% of the jobs in our industry. Lord Kelvin's oft quoted comment is as true of human as electrical quantities—"When you can measure what you are speaking about and express it in numbers, you know something about it."

THE MEN WHO REALLY KNOW...

KNOW

MEET "RED" LAMBERT, Superintendent for Whitehead Electric Company, Atlanta, Ga. During "Red's" 15 years in the electrical construction industry, he has used a great many EFCOR fittings and boxes like the one he is holding. In the 1375 Peachtree Building, The Whitehead Electric Company and professionals like "Red" and his men rely on top quality products like those manufactured by EFCOR, to match the integrity of their own work. The men who really know . . . know EFCOR.

Efcor



ELECTRICAL FITTINGS CORPORATION • WOODSIDE 77, N. Y.

150,000

ELECTRICAL WEST
FEBRUARY 1961

CONTRACTING & CONSTRUCTION SECTION

STATISTICS / COSTS / PROPOSED PROJECTS / NEW PRODUCTS / NEWS

LATE NEWS FLASHES

New Wire Table for Safety Orders

Wire carrying capacity tables of the National Electrical Code, rejected since 1940 by the State of California's Electrical Safety Orders, came up again in the hearings in Los Angeles and San Francisco in January and were again rejected as impractical and unrealistic. Then in a surprise recommendation, a new and simple table was submitted which met with favorable reaction from all parties to the long hassle. It resulted from many meetings between wire manufacturers, inspectors, industrial plant engineers and state safety inspectors. In it the wire sizes are directly related to the sizes of fuse or circuit breaker protection. There is one column for continuous duty rating, for such loads as heating, plant lighting, etc.; another column for noncontinuous duty. The ratings follow very closely those of both the NECode and the ESO but so simplified that they will be followed and used.

IES Regional Program Will Differ

Charles Gibson, program chairman for the South Pacific Coast regional technical conference to be held at Sacramento Inn, May 3-5, promises a different approach to such programs this year. He has described his general program theory at the series of IES section and chapter meetings he addressed on the "circuit" arranged for him in January throughout California. Instead of product presentations, the approach will be through research, then technique to application. Thus the findings under grants by the IES Research Institute will be reviewed first by the head researchers and then means to apply such results to practical field problems explored by engineers and manufacturers' designers. Gibson is chief of California's Bureau of School Planning.

Continued on page 90

Page 96 NEW PRODUCTS
114 ESTIMATOR'S GUIDE
108 PROPOSED WESTERN PROJECTS
106 READER SERVICE SECTION

150,000

90,000

135,000

217,000

300,000

125,000

160,000

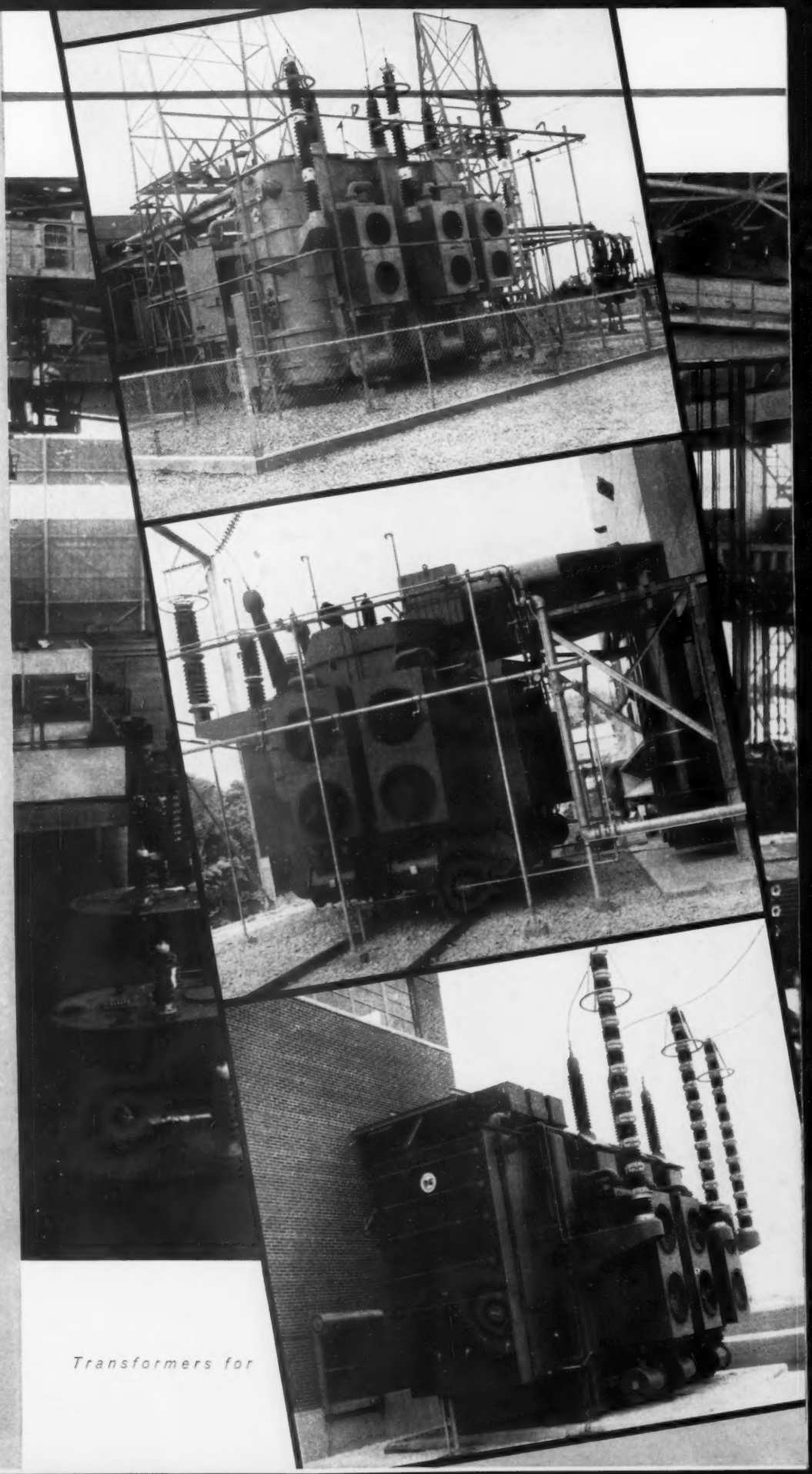
96,000

75,000

200,000

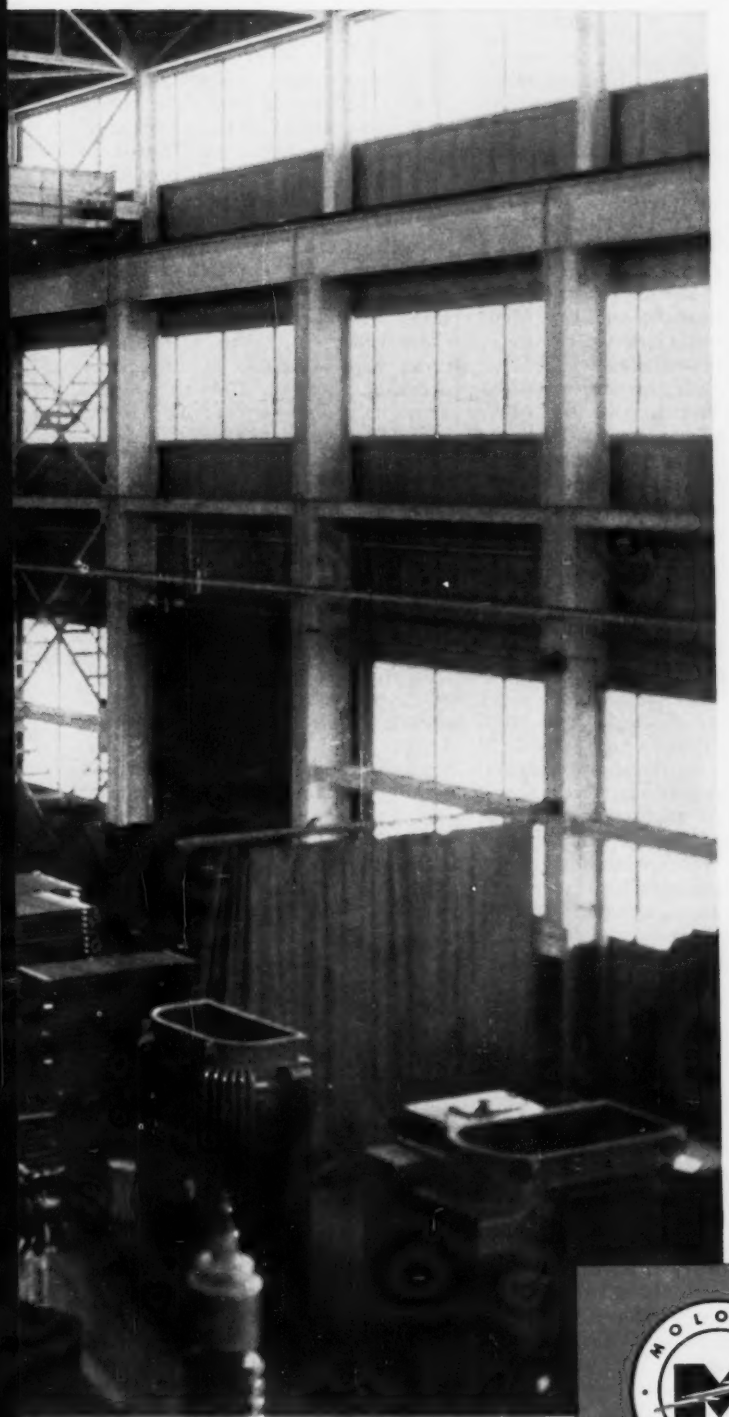
100,000

230,000



Transformers for

—THE NUMBER YOU PICK . . .



depends on carefully calculated system requirements of present and future loads. So too, must the manufacturer of power transformers be chosen, carefully . . . and with an eye to the future.

To this end, careful consideration of Moloney Electric Company's qualifications will reveal these facts:

- Sixty-five years experience in designing transformers of all types and sizes.
- Modern, extensive facilities with the capacity to produce transformers of any size or rating.
- Unexcelled product operating records.
- Continuous research and development to improve transformer design and manufacture.

This ability to design and manufacture efficient, dependable transformers of any rating is a carefully calculated result of Moloney planning and preparation.

When "the number you pick" is determined, be sure that your requirements are adequately fulfilled, specify Moloney Transformers . . . All Along The Line.

ME59-8

MOLONEY ELECTRIC

FACTORIES
ST. LOUIS 20, MISSOURI
TORONTO, ONT., CAN.

SALES OFFICES
IN ALL PRINCIPAL CITIES

Utilities, Industry, and Electronic Applications

TO COMPLY WITH
THE REVISED CODE
SPECIFY THESE
NEW

20 AMP
GROUND DEVICES

No. 877B
Brown
No. 877V
Ivory
20 Amp
125 Volts

Individually
"SHO-PAK" boxed.

No. 809
20 Amp
125 Volts

EASY TO INSTALL
DEPENDABLE • ECONOMICAL
Sturdily designed to eliminate callbacks and to more than protect your customers where 20 Amp, 125 Volt devices are called for. Specify these new, dependable Eagle 20 Amp devices for your next job and profit from their extra-quality features—At No Extra Cost. Underwriters' Listed. Ask your distributor about them, or send for free sample.

IN STOCK AT
PORTLAND, SAN FRANCISCO,
LOS ANGELES WAREHOUSES
Sold Thru Wholesalers Only

"Perfection is not an Accident"
EAGLE ELECTRIC
MFG. CO., INC.
LONG ISLAND CITY 1, NEW YORK

Motors and Controls—XIX

RECONCILE MOTOR HEAT

TOM HUGHES, CALIFORNIA DIVISION OF INDUSTRIAL SAFETY

In this and the following section we are going to interject some more aspects that may thoroughly confuse or discourage any of the uninitiated who have stayed with us thus far in this series on motors. But we told you that this is a complex life we are living and it's getting steadily more complex. We are going to have either to pull ourselves up to the plane of enlightenment that goes with automated existence or revert to the pick-n-shovel class.

We will finish this series with a summary and outline of the highlights that one should use as a check-off list but, in order to be satisfied (sold) with the merits of these fundamentals, we must test each fact (the pros and cons) that confronts us. Intelligent sales resistance can only be based upon a thorough familiarity with the complete vocabulary used by the person who is trying to distort the facts. This is the same in medicine, philosophy, political science or what have you.

It takes only about five minutes of discussion in any category such as grounding or motor protection (in a mixed group of electrical men) before you find two individuals using the same words but thinking in terms of different principles or results. So please forgive us if we overstrain your patience in laying a thorough ground work.

We have discussed the more obvious and easier recognized features of the time tested motor protective devices for three-phase induction motors. We have admitted that each has a rightful place in the picture but we have deplored the fact that there are a large per cent of them wrongly applied today. Of course the earlier part of this series was to show that, more often than not, *the overcurrent protector is wrongly applied because it is applied to a motor that is wrongly applied.*

So let's try to wrap up these considerations in one over-all package on misapplication. What do we mean when we say we have been working on the wrong end of the problem? Well, from the very start of the series we have agreed that the end product that concerns us is heat.

Every manufacturer or test laboratory that runs a series of tests on a thermal relay or dashpot relay executes the tests with one relay or set of relays under controlled conditions. They then publish the results of the test and extol its performance by such statements as, "faithfully duplicated the heating conditions found in the motor" or "aptly differentiates between harmful and unharmful overloads of the motor."

Architects or original installers then drink up these flowery descriptions and pack a whole bunch of these relays into one little utility room with all kinds of other heat-producing devices. Then the cabinet manufacturers compete with each other to cram these poor relays closer and closer to each other in motor control panels—to please the architects and business executives, who don't have to live with them.

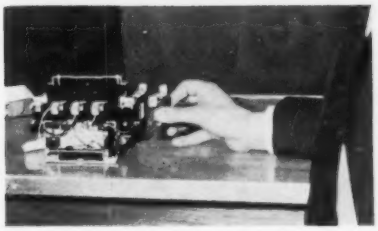
Now if you read the fine print notes at the end of the advertising literature you find a statement that this relay was designed to operate with the normal heater element in an ambient of 40 C (104 F). Another note tells you that if this relay is enclosed with other heat-producing devices (and other relays are heat-producing devices—not to mention circuit breakers, indicator lamps, etc.) a larger size heating element than the one listed in the table should be used.

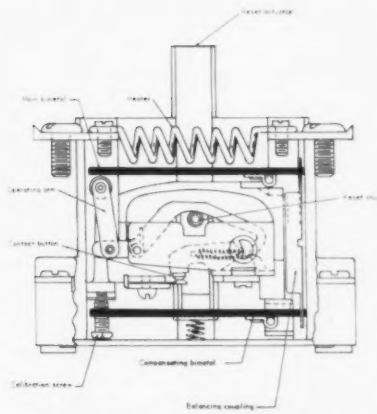
Another fine print note tells you that if the ambient temperature at the motor exceeds that at the starter by 15 C you should use a size smaller heater element. But if the motor ambient is 15 C lower than that at the starter you should use a size larger. And don't forget the size larger we have already applied because we stuck the relay in with circuit breakers and other heaters.

Does all this get kind of confusing? Well, some manufacturers furnish what they call an ambient-compensated relay and others furnish a list of correction factors you apply to the motor running-current value you are seeking in the heater table.

That sounds nice but what do I do when I have an outdoor well pump motor operating intermittently with an indoor starter? At 2 a.m. the motor's ambient is at least 15 C lower than that of the starter and at 2 p.m. its ambient may approach 15 C higher than that of the starter. Do I have to change the heater elements from morning to night?

We actually know some oil field





Arrow's ambient compensating relay

operators that change the heaters from summer to winter. Both the motor starter and motor are in the same ambient (50 ft or so apart) but the motor is self-ventilating and the starter isn't. Although the motor runs continuously they have experienced nuisance tripping without this rotation of heaters. Nuisance tripping means expensive sanding of some oil wells and can not be tolerated. But think of the number of heater elements to be carried in stock and sorted each season.

Another glaring example of disparity between motor and relay ambients is the submersible water pump motor—several hundred feet below grade. Its ambient is established by a stable water temperature while the atmosphere surrounding the protective relay may vary from freezing to desert temperatures.

And please take note that you never find any sales literature for relays that calls attention to the need for ventilation. When you study physics you learn about radiation, convection and conduction. Pretty sounding words having to do with the moving of heat. But they don't mean a thing if there's no place to move it to. You can't conduct it any place but up against another heating device in that control panel and you can't radiate it if the surrounding air is cluttered with air conditioning compressors, boilers, etc. So moving enough cool air is the only answer.

Then, getting to the motors. Who worries about ventilation for them? The manufacturer tries to make the motor so that it can properly ventilate itself if given a chance. But, sticking it up in a closed attic, down in a pit, on top of an oven, or within the enclosure of a machine or package unit is taking chances.

What we are trying to emphasize here is that an ideal mating of running-overcurrent relays with conditions likely to exist at the motor is beyond our hopes in a large share of cases. That is why we call them non-coordinated protectors. But then there is another factor that enters into their choice. That factor is the terms used to designate motor duty. This is another subject that evidences a wide divergence of ideas when opened to group discussion.

So let's have a look: **Continuous Duty**—That's easy. The blower in the large hospital or hotel kitchen runs all the time or they'll be looking for the engineer.

Short Time Duty — refers to the motor that starts up every hour or so and runs at fairly constant load until completing its task.

Periodic Duty — is a motor that starts and stops over periodic spaces in time but handles a fairly constant load—such as an air compressor or pressure pump.

Intermittent Duty—suggests a motor that operates at an approximation of uniform loading but is started and stopped at the whim of an operator. This would fit the average machine tool motor such as drill press, mill spindle, etc.

Varying Duty—means that timing and loading varies all over the place. At one time this designation would fit only crane motors and rolling mill motors but now it fits all too many not misapplied motors.

There is one duty that is not listed in codes that is worst of all:

That is **reversing continuous** and would apply to commercial washing machines and many such loads. The terrible thing about a washing machine is that it not only has to reverse and start up again but it has to do it while its load is still swirling around in its original direction of movement. Even the starter contacts take a murderous beating.

This list illustrates our conglomerate problems of getting our load in reasonable shape; choosing a motor that can safely handle such a load without producing intolerable hot spots in its winding; appraising the motor's needs in overcurrent protection; and finally choosing the overcurrent protector that will match these needs.

Now Available... the EASIEST CLINCHING fitting in the industry!

ETP INDENTER COUPLINGS & CONNECTORS

■ Special Soft Steel for Easy Crimping ■ Solid One Piece ■ Rolled Thread ■ Concrete Tight ■ Competitively Priced ■ ½", ¾", and 1" Sizes.

ETP makes clinching easy with this new type coupling and connector. **A dead soft steel**—especially formulated and processed—is used for easy crimping.

- Precision rolled thread for 65% greater strength.
- One-piece solid tubular steel — cannot open or spread.
- Sparkling corrosion-resistant zinc chromate overplating.
- Far exceeds requirements of UL file card No. 24788.

CONNECT WITH ETP *FOR ECONOMY!*

WRITE TODAY FOR SAMPLES AND PRICE LIST

INDIVIDUALLY TESTED FOR UNIFORMITY AND PACKED IN HANDY EASY-TO-IDENTIFY BOXES

ETP

ELECTRICAL TUBULAR PRODUCTS

74-15 GRAND AVE., MASPETH (N.Y.C.), N.Y.

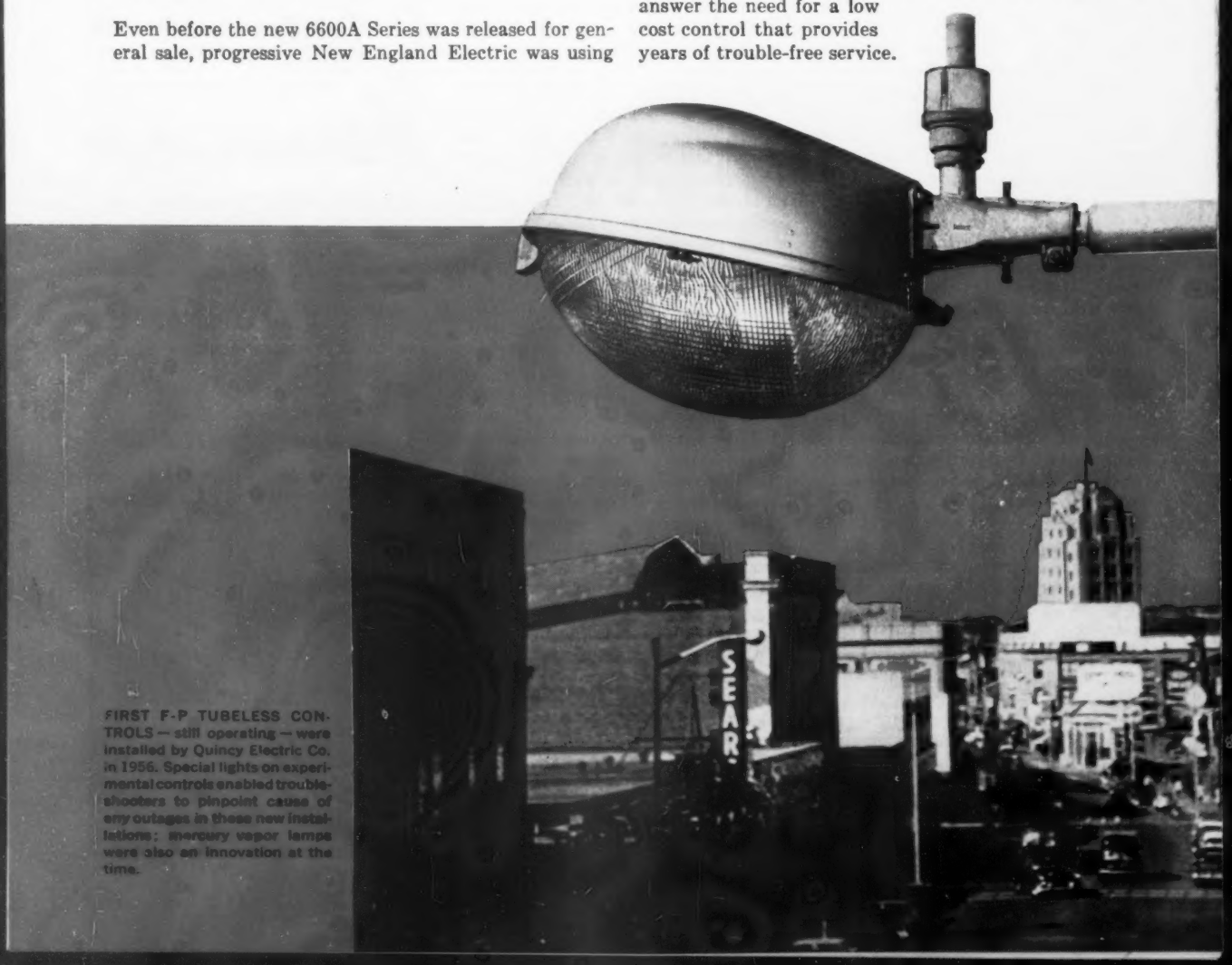
DEfender 5-8000

OPERATING SINCE 1946 without attention — F-P Series 61300 Control near the State House, Providence, R. I.

New England Electric Made Lighting History With First Use of F-P Controls

The first large-scale user of the original Fisher-Pierce photocontrol was the utility that provided the power we used in manufacturing it — New England Electric System. After as long as 14 years of completely maintenance-free operation, many of these Series 61300 units are still giving useful service. They've been useful to us, too, providing experience for development of later tube-type controls — and the present Series 6600A tubeless controls.

Even before the new 6600A Series was released for general sale, progressive New England Electric was using strange looking F-P tubeless controls in Quincy, Mass., on an experimental basis. Many of these specially built "experimental" controls, installed in 1956, are *still* operating Quincy's mercury vapor lamps — also an innovation at that time. Now firmly established, multiple individual control — with no separate high voltage street-lighting line — has served to reduce outage headaches from fierce New England storms. Overcoming all of the disadvantages of time switching, Fisher-Pierce controls answer the need for a low cost control that provides years of trouble-free service.

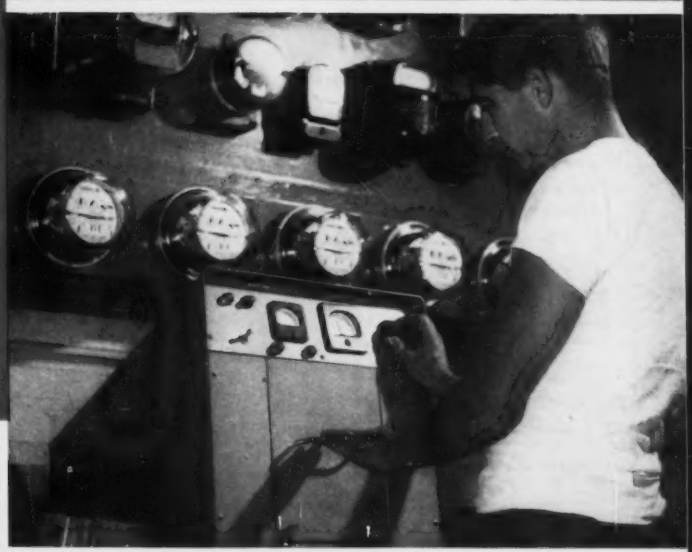


FIRST F-P TUBELESS CONTROLS — still operating — were installed by Quincy Electric Co. in 1956. Special lights on experimental controls enabled trouble-shooters to pinpoint cause of any outages in these new installations; mercury vapor lamps were also an innovation at the time.

HISTORIC QUINCY, MASS. (top right), home of John Adams and John Quincy Adams. Both presidents are buried in the United First Parish Church, shown here.

AT WORCESTER COUNTY ELECTRIC CO. the F-P Series 6100 Calibrator (right) is being used for setting foot-candle operate values. As the operator gradually varies the light intensity, a front panel light indicates control operation and a foot-candle meter shows the operate value. Short time delay in F-P controls permits fast checking here and in the field.

NEW SERIES 6700 CONTROLS (bottom right) installed on 240-volt lines by Narragansett Electric Co. in Providence, R.I. These controls use the basic 6600A circuit, as modified for 240-volt operation.



STILL MAKING HISTORY, New England Electric participated in building one of the nation's first atomic electric plants. The 136,000-kilowatt Yankee Atomic Electric plant at Rowe, Mass., is now in operation.

For complete design information and operating specifications on Series 6600A and 6700 controls, and the Series 6100 Calibrator, write The Fisher-Pierce Co., 43 Pearl Street, South Braintree 85, Massachusetts.

FP

FISHER PIERCE

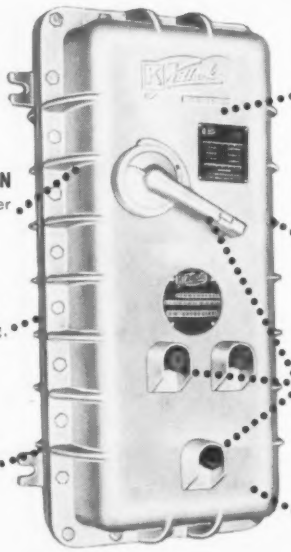
Electrical and Electronic Equipment for Industry, Utilities and the Home

AN AFFILIATE OF SIGMA INSTRUMENTS, INC.

Killark control enclosures are best... BECAUSE THEY WERE DESIGNED IN THE FIELD

The Result of Field Tests . . . Plant Surveys . . . Consultation with Electricians, Electrical Engineers, Contractors

EXAMPLE:
An explosion-proof combination starter:



ALL-ALUMINUM
Lightweight, non-corrosible. Efficient thermal conductivity, non-magnetic.

RIBBED CONSTRUCTION
Maximum strength, faster heat dissipation.

RECTANGULAR SHAPE
Easier installation, better fit for components.

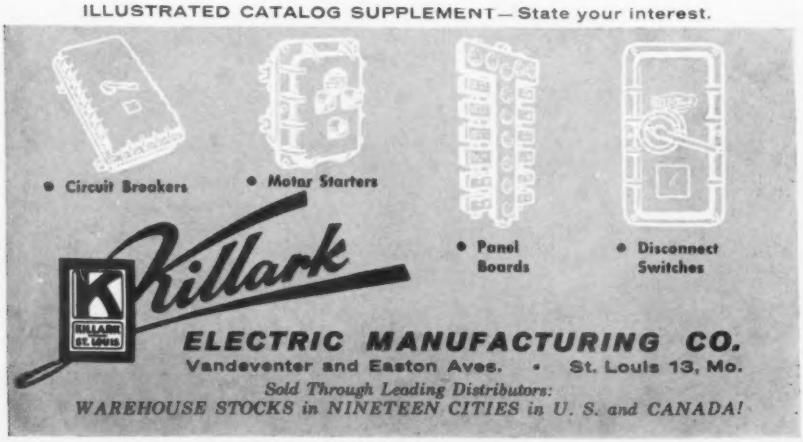
SPLIT-BOX DESIGN
Simpler wire pulling, easier accessibility.

FRONT OPERATION
Positive handle mechanism provides for 3 locks, safety guarded start-stop reset buttons.

GROUND SURFACES
Carefully machined for tighter fit. No stripped or galled threads.

HEAVY WALLS
Hubs of any size, located anywhere you want them.

ILLUSTRATED CATALOG SUPPLEMENT—State your interest.



ELECTRIC MANUFACTURING CO.
Vandeventer and Easton Aves. • St. Louis 13, Mo.
Sold Through Leading Distributors:
WAREHOUSE STOCKS in NINETEEN CITIES in U. S. and CANADA!

LATE NEWS

Continued from p 83

Warned to Slow Down

Visits to the annual spring meetings of the chapters of the International Association of Electrical Inspectors by headquarters officers may not be forthcoming this year. Both Frank Stetka, NFPA field secretary and code advisor, and Everett Cogan, IAEI secretary-treasurer, have been warned by doctors to slow down their 60-hr-week pace. The rugged strain of both travel to meetings and of intense detail study and processing of code change proposals hospitalized Stetka and brought a warning to Cogan. Chapter demands for personal visitation should give some consideration to the work load their head men carry.

► Harry W. Abrahams, examiner for the California State Contractors' License Board and in charge of the San Francisco district office, was honored last month for 25 years meritorious service. He was the first administrative employee of the board appointed under the civil service merit system. He was highest in grade over 700 competitors and has maintained highest grade in five subsequent tests. For many years he was mainly responsible for the examination procedures of the board, which have been used as a model by other states. He is a licensed architect and engineer and prior to his state job was in private construction practice.

► **Ralph Ecker,** Pasco, Wash., has been named president of the Inland Empire Chapter of the National Electrical Contractors Assn. He succeeds Gordon A. A. Smith, Spokane. Other officers are D. O. Quinton, Spokane, first vice president and chairman of the chapter's Spokane and eastern division; Don Swartz, Moses Lake, Wash., second vice president and chairman of the central division; and Roderic Anderson, Spokane, treasurer. Renamed secretary and manager for the 11th year was Robert L. Wilkinson, Spokane. Paul Briggs, Spokane, was renamed governor.

► A new firm, **Mission Electric and Plumbing Supply,** has been opened in Portland at 5231 S. E. McLoughlin Blvd. **Walter Pelett,** formerly with Peerless Pacific Co., is principal owner. **Melvin Powell,** who has had 16 years in the electrical contracting field in Portland, heads the electrical department.

Manufacturers—Distributors

► **C. E. Ingalls & Sons** has announced a new name and a new address. Renamed **Ingalls Associates,** the firm has moved to 424 40th St., Oakland 9, Calif. Telephone is OLympic 8-5622. Among the companies Ingalls represents are G & W Electric Specialty, Kerite, Royal Electric Mfg., and Thomas & Betts' utility division. Principals in the firm are C. E. and R. E. Ingalls.

► **Gedney Electric Co.** has announced new sales representatives in the Northwest. Seattle is now handled by **J. H. Stumph,** 1000 4th Ave. S., zone 4; Portland by **George M. Roth,** 1504 N.W. Johnson St., zone 9.

► **Robert D. Florence** of Denver has been made representative for **Frank Adam Electric Co.,** and will cover Colorado and parts of Wyoming and Nebraska. Florence has had more than 10 years of experience in the electrical business as an agent and is a charter member of the Rocky Mountain Electrical Representatives Club.

Florence

► **C. R. Lynch & Sons** of Los Angeles and Phoenix has been appointed sales representative for John E. Fast & Co. Main office is at 3307 Glendale Blvd., Los Angeles 39; branch at 1146 E. Roosevelt St., Phoenix.

► **Plans for establishment of a new advanced computer development** and research laboratory at Sunnyvale, Calif., have been announced by Clair C. Lasher, general manager of General Electric's computer department at Phoenix. Construction of the 49,000-sq-ft laboratory is expected to start in the spring with occupancy scheduled for December 1961.

► **Nu-Art Lighting & Mfg.** Co. has moved to an expanded manufacturing plant at 2360 W. 21st South St. in Salt Lake City. The company has more than doubled its size, has added more warehousing space and has installed the latest in manufacturing machinery and methods, according to Herbert R. Schoeph, president.

► **Fisher-Pierce** Co. has appointed **Hamilton Associates** as its sales representative for Colorado, New Mexico, and parts of Wyoming and Texas. Headquarters are at 1236 Elati St., Denver.

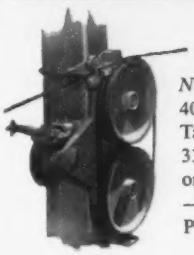
► **S. D. White Co.** of Seattle has been appointed sales representative for the Lamplighter series 15,000 photoelectric control, developed by the **Acme Wire Co., Utility Products Division. Jensen Electrical Mfg. Co.** of Canada is the representative in Vancouver, B. C.

► **Columbia Cable & Electric Corp.** has appointed **Bergman-Marshall Co.** of San Francisco as northern California and Reno representative.

Westerners attending the recent general sales conference of Holophane Co. in New City, N. Y., included J. G. Platt, Los Angeles; H. E. Gypson, Littleton, Colo.; F. Sliney, Santa Monica, Calif.; J. J. McCullough, Hayward, Calif.; R. G. Dummel, San Francisco; Paul Davis, Bremerton, Wash.

NEW

PENGO POLE-MOUNT TENSIONER



Now...PENGO 4000 Tensioner Takes Conductor to 336,500 cm-ACSR or 397,500 cm-AAC —Tensions to 1,000 Pounds!

Here's a bullwheel tensioner you can carry in every line truck! It features two 18 inch neoprene lined bullwheels. Tru-Stop disc brake – yet weighs so little it's truly portable.

Two men can easily place the 4000 PM against the pole, attach it (chains and wing-nut tightener are permanently attached to tensioner), and start stringing in a matter of minutes. Conductor can be payed off any suitable reel stand. A collapsible reel attached to a winch shaft makes a practical puller, although any type of power previously used for pulling can be used.

TENSION WIRE STRINGING is the safe, economical modern way to string distribution and transmission lines. Why not get the facts? Write for new PENGO catalog TSE-1 for full data on the world's largest, most complete line of tension stringing equipment. Please address Dept. 34.

PETERSEN ENGINEERING CO., INC.
460 Kifer Road
Santa Clara, California
Phone: AXminster 6-7712

B-15

1.

2.

3.

Outdoor Lighting Institute

General Electric's Outdoor Lighting Institute, a customer training school, toured the West Coast for three weeks, giving sessions at Los Angeles, San Francisco and Portland for several hundred engineers from utilities, consulting engineering firms and other organizations. Started in 1911, the institute is generally conducted in Hendersonville, N. C., headquarters. The traveling team was headed by J. Stanford Smith, department general manager. Pictured here are (1) W. E. Johnson, Glendale; Treece Johnson, Anaheim; James Ritter, Anaheim; Don Foulkes, G-E, Los Angeles; G. W. Weist, Southern California Edison; (2) Stan Peters, Los Angeles; H. O. Whitley, Los Angeles; Lee L. Burnside, Los Angeles; C. K. Carlson, Edison; (3) Jim Dowtin, G-E, Hendersonville; C. N. McGehee, Los Angeles; L. L. Isley, California Electric Power; L. N. Tilson, Edison; H. W. Buckles, Arizona Public Service

► **John C. Virden Co.** has appointed **Boylhart, Lovett & Dean** of Los Angeles as director of its advertising and public relations. President John C. Virden Jr. said that the Western sales and advertising program will include **Lighting Dynamics** Division. Headquarters for the Western operation are in the new Lighting Dynamics plant in southern California.

► **Andrew L. Polich Inc.,** 734 N. W. Glisan St., Portland, has taken on the Retelco line of battery-charging equipment and converters and will represent it in the Pacific Northwest states. The line is manufactured in Seattle.

► **Bruce Emmett Co.,** 830 S.E. Alder St., Portland, has been appointed representative in Oregon, Washington, Idaho, Utah and Montana for the Steel Duct Co. of Youngstown, Ohio.

► **Don H. Burcham Co.** has acquired the assets and lines of the 25-year-old Seattle firm, Dave M. Lee Co. With the acquisition Don Burcham became Northwest representative for Quam-Nichols speakers, Littlefuse, Howard W. Sands Co., E. F. Johnson Co., Jensen Industries, Lowell Mfg. Co., United Catalog Publishers and Kurman relays. **Joe Belusko,** former president of Dave Lee Co., and **Mel Weston** of that firm have joined Burcham's Portland staff and **Dan Smith** has gone to the Seattle branch office.

► **Milton E. Casper** has been made manager of **Westinghouse Electric's** Pacific Coast supply depot at Clearfield, Utah. He steps up from the post of traffic manager at the depot.

► **Ed Maupin** has opened his own office as manufacturers' representative covering Arizona and California at 5501 Wilshire Blvd., Los Angeles. He was formerly with Earl S. Condon Co.

► **Leach** Corp. has opened a San Francisco district office at 814 San Antonio Road, Palo Alto. Telephone number is YOrkshire 8-4408. **Joseph Pares** is representative.

► **Ryall Electric Supply** Co. of Denver recently moved to a new 30,000-sq ft warehouse and office building at 2627 W. Sixth Ave., it was announced by N. L. Willard.

► **Fuel cells are now a practical source of power** and a 45-lb unit, portable power source for field use, is ready for delivery to the U. S. Marine Corps, Walter C. O'Connell, general manager of General Electric's Aircraft Accessory Turbine Department, announced recently. He cautioned that the rapid development of this new source for military use does not mean that it will be immediately available in the consumer field. Although technically feasible today, fuel cell power plants for the home and automobile will continue to be economicaly impracticable for a long time to come, he said.

► **S&C Electric Co.** is sending four road show models of its new Circuit-Switcher into the field for demonstrations to utilities and others interested. Introduced six months ago, the unit is a 34.5- to 138-kv load interrupting device combining features of load interrupter switches and circuit breakers.

► **Warren Losh** has purchased the residential branch of Slater Electric Co. in Carmichael, Calif. A new name, Wilco Electric Co., is being given the organization.

KNOW YOUR SYMBOLS

This symbol stands for fusible switch

This symbol stands for QUALITY

THE SAFETY SWITCH THAT CHALLENGES COMPARISON . . .

BullDog's general-duty safety switch!

- **Minimum arcing—double break switching**
- **Arc control—Vacu-Break® principle**
- **Pressure contacts—Clampmatic® spring action**
- **Positive switching—direct handle operation**
- **Front operation—permits ganging**

. . . plus, all current-carrying parts are silvered. Available in NEMA 1 and NEMA 3R enclosures . . . competitively priced. Challenge our distributors to prove these switches are the finest. Write for details!

BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Michigan. In Canada: 80 Clayson Rd., Toronto, Ont. Export Division: 13 East 40th St., New York 16, N. Y.

Consult the following Pacific Coast representatives:

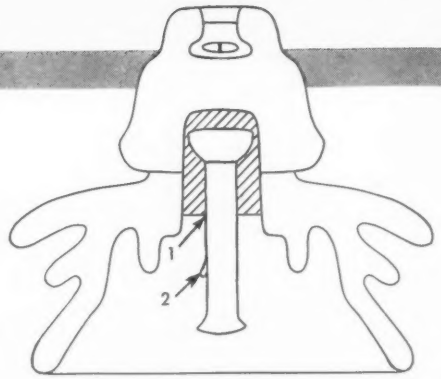
Coast Electric & Manufacturing Co.
1733 N. E. Seventh Ave., P. O. Box 7866
Portland 12, Oregon

Young Electric & Mfg. Co.
2134 Curtis St.
Denver 2, Colorado

Safety Switchboard Company
910-89th Avenue
Oakland 21, California

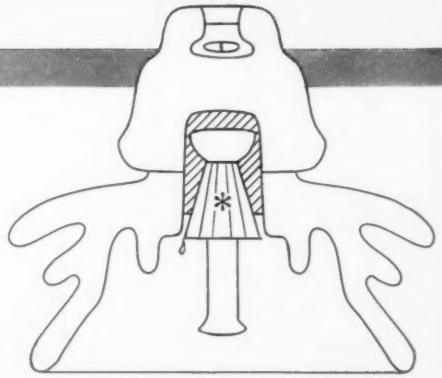
BullDog Elec. Prod. Co. of Los Angeles
3020 Supply Ave.
Los Angeles 22, California

I-T-E CIRCUIT BREAKER COMPANY
BULLDOG ELECTRIC PRODUCTS DIVISION



Conventional Smogtype suspension insulator

Extra leakage distance offers no protection from corrosive attack on the pin above the cement line (1) or from corrosive attack on the shank (2). Compare this with the sketch at right.



Futura Smogtype suspension insulator

Corrosion Intercepting Sleeve yields slightly as rust products form above cement line, preventing cracking of the porcelain. Sleeve also diverts corrosive salt-water drainage from the pin shank.

specify FUTURA® WITH C.I.S.* to

*CORROSION INTERCEPTING SLEEVE

Conventional Smogtype insulators have only one defense against contamination - - extra leakage distance.

Sometimes, it isn't enough.

To see why, examine the unretouched photograph on the right.

It shows a conventional Smogtype suspension insulator after an extended period of service on a 69-kv line in a heavily contaminated atmosphere - - the "natural habitat," you might say, of all Smogtypes.

Under these conditions, the insulator - - thanks to its 50% greater leakage distance - - protected the line from flashovers - - for a time.

But greater leakage distance, unfortunately, couldn't protect the insulator *itself* from the inevitable by-product of contamination - - *corrosion.*

Moisture, saturated with corrosive salts (dissolved out of surface contaminants), diffused across the underside of the porcelain and across the cement joint to the pin, where the corrosive attack began.

Creeping upward in the cement joint by capillary attraction, the moisture formed rust products (hard as cast iron) between pin and cement - - rust products that expanded in volume until the porcelain cracked.

Drainage down the pin shank fed a simultaneous attack, destroying metal and freezing the clevis connection.

In heavily contaminated "Smogtype" atmospheres, where corrosion hits hardest, you often need *more* than extra leakage distance - - you need *corrosion protection* for the insulator *itself.*

You can get it today, in Smogtypes or non-Smogtypes, by specifying Futura insulators with the exclusive Corrosion Intercepting Sleeve.

Only Futura *protects itself* and your transmission line, too!

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass

PORCELAIN INSULATORS • LINE HARDWARE • CAPACITORS • LIGHTNING ARRESTERS
BUSHINGS • HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES • BRONZE VALVES

HOLAN

10082-H

the finest smogtype insulators made today...

lick corrosion

sometimes aren't good enough!
(without C.I.S.)*

PRODUCT NEWS

New Designs and Applications

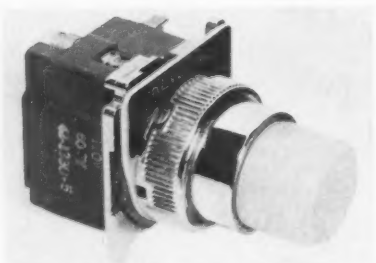
Concrete-Encased Conduit

(10) *Plasti-Con Pipe Co., Auburn, Calif.*

This company has recently entered the field of franchising dealers to use its patented machine to install plastic conduit embedded in concrete for use in underground power systems.

The machine will accommodate all standard conduit sizes from 2 to 6 in. in diameter and will handle up to eight separate conduits at one time. The plastic conduit is installed in 30-ft lengths, which are assembled outside the trench and easily lowered into position by hand. The ends of the conduit are bonded together in a fast, permanent weld. The chemical weld is described as stronger than the pipe itself. With the fitted pipe in place, it is slipped into the Plastic-Con machine for the concrete pouring operation.

In eliminating the weight problems of standard conduit and the need for time-consuming placing and tapering of joints, the manufacturer claims the plastic conduit can be installed at a rate from 300 to 600 ft an hour by a minimum size crew.



Push-Button Light

(11) *Cutler-Hammer, 315 N. 12th St., Milwaukee 1, Wis.*

Cutler-Hammer has introduced an oil tight, illuminated push button that combines the functions of a push button and an indicating light in a single unit. The illuminated push button incorporates a color-coded, molded-type transformer that is designed to be immune to voltage surge lamp damage and a multiple contact block that can be operated with any combination of NO or NC contacts.

Liquid Cooled Bus

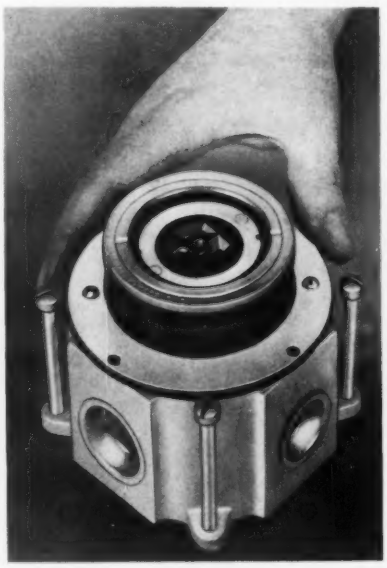
(12) *I-T-E Circuit Breaker Co., 19th and Hamilton Sts., Philadelphia, Pa.*

Liquid cooling of isolated phase bus in three-phase arrangement is being offered by I-T-E's Greensburg division. The bus is designed to carry 10,000 amp, and may be cooled by water or oil. The company claims significant gains in lower operation costs and a savings in space for bus runs carrying 10,000 amp for distances of 200 ft or more. No additional cooling is required for runs as long as 1,000 ft.

Impact Wrench

(13) *Albertson & Co. Inc., Sioux City, Iowa*

Installation of crossarms on poles is considerably speeded according to Albertson & Co., with use of its new lineman's all-purpose kit No. 336C. Basically, the tool is a Sioux No. 336 electric impact wrench with a 7/16-in. quick-change chuck. Nine bits from ½ x 10 in. long to 11/16 x 18 in. long and nine double square, extra long sockets from 9/16 to 1 1/16 in. are furnished with the wrench in a steel case. The impact wrench bores rapidly. The quick-change chuck makes possible a rapid change to the socket for nut running and tightening.



Waterproof Floor Box

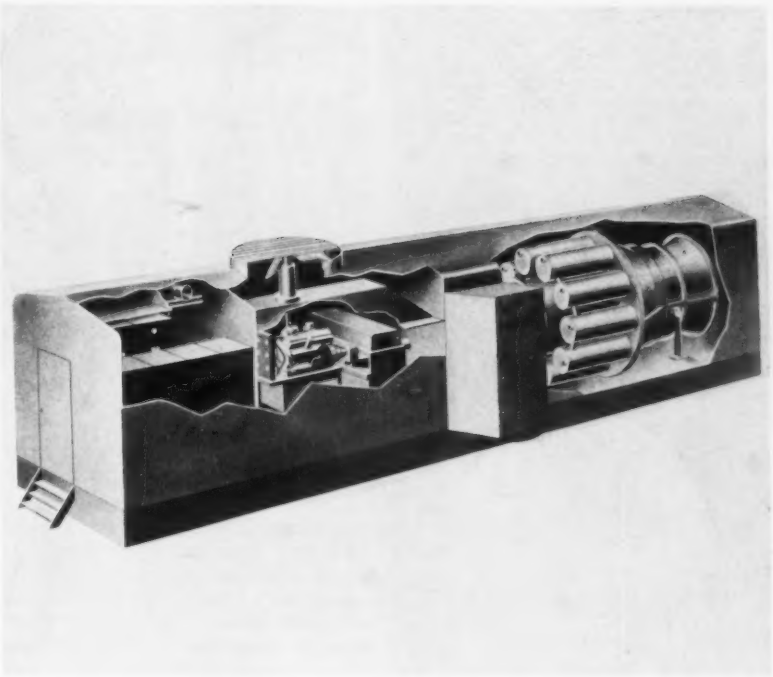
(14) *H. K. Porter Co. Inc., National Electric Division, Porter Building, Pittsburgh 19, Pa.*

A new 800-CI series cast iron floor box for waterproof installation, now being marketed by the National Electric Division, is said to feature the ability to accommodate the widest range of receptacles. All components of the new box can be used with National Electric's 800 series standard floor box.

New Fuse Tubes

(15) *S&C Electric Co., 4435 N. Ravenswood, Chicago 40, Ill.*

Introduction of two new fuse tubes and a new disconnect blade by S&C now permits interchanging any of five different ratings in a single open cutout. Fully interchangeable in type XS single-vented cutouts are a new 300-amp disconnect blade, a new 200-amp fuse tube, a new 100-amp fuse tube plus two existing 100-amp fuse tubes. Cutout ratings can be changed as quickly as a lineman can change fuse tubes or blades. Full load switching is available with Loadbuster, S&C's portable load-break tool.



Gas Turbine-Generator

(18) *General Electric Co., Schenectady 5, N. Y.*

G-E today announced a gas turbine package power plant which it says can be purchased for $100 per kw and can be in operation 10 days after delivery. These self-contained, factory assembled power plants are said to be ideally suited for peak load, emergency or stand-by service. The 11,000-kw packaged units are self-contained and capable of operation in conjunction with other generating equipment or as an isolated and independent station. It can be started without any external source of power and can be on the line at full load in less than 15 minutes.

Handy Tester

(16) *BullDog Electric Products Co., Division I-T-E Circuit Breaker Co., 7610 Joseph Campau Ave., Detroit, Mich.*

A lightweight voltage tester, continuity tester and flashlight is a pocket tool about the size of a package of king-size cigarettes, offered by this company as a valuable tool for the professional electrician.

Rubber Push-Button Station

(17) *Joy Mfg. Co., Electrical Products Division, St. Louis, Mo.*

A new heavy-duty push-button station of corrosionproof, all-rubber, weather-sealed construction has been introduced by Joy Mfg. Co.

Known as the Flexitite switch, it is recommended for any two-station push-button application, such as start-stop, up-down, forward-reverse, off-on, etc. The production model meets NEMA types 1, 4 and 5 enclosure requirements for both heavy- and standard-duty operation and fits all standard FS and FD boxes.

Industrial Safety Switch

(19) *General Electric Co., Plainville, Conn.*

General Electric's Circuit Protective Device Department recently introduced a new industrial safety switch type TH heavy-duty, and type THD, heavy-duty interrupter, which are said to be capable of withstanding the tremendous energy of a 200,000-amp short circuit when used with CLF high capacity or other current-limiting fuses of comparable characteristics as defined by NEMA.

Thermostat

(20) *Ceilheat Inc., 5212 Homberg Dr., Knoxville, Tenn.*

Ceilheat has added thermostats to its line of electrical heating equipment called the Room Mate.

Nylon Sling

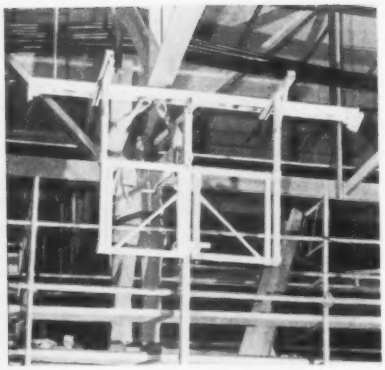
(21) *Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh 30, Pa.*

A nylon sling, developed by the Wire Rope Division of this company, is shown lifting a reel of aluminum cable. The smooth, soft slings are recommended for lifting finished products, machined surfaces or soft metals to protect them from damage when moving. A complete line of slings is available in a large selection of types and sizes with aluminum and steel fittings.

Earl S. Condon
COMPANY
Engineering Representatives

- Arizona Gear & Mfg. Co.
- Burndy Corporation (U. I. DIVISION)
- Collyer Insulated Wire Company
- Convair Instruments (DIVISION OF GENERAL DYNAMICS)
- Halex, Inc.
- Hughes Aircraft Company (INDUSTRIAL SYSTEMS DIVISION)
- Husky Products, Incorporated (DIVISION OF BURNDY CORPORATION)
- Kurz & Root (COMMERCIAL DIVISION)
- Lapp Insulator Co., Inc.
- Lotran, Inc.
- Phelps Dodge (MII-C-13777 only)
- Preformed Line Products
- Slater Electric Mfg. Co.
- Standard Elec. Products Co.
- Stromberg Carlson
- Western Switchboard

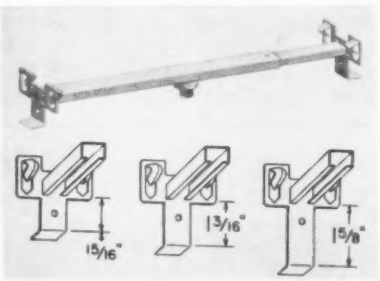
3450 Wilshire Blvd., Los Angeles 5, Calif.
Phone: DU 1-3951 • TWX: LA-795



Fluorescent Fixture Hoist

(22) *Up-Right Scaffolds*, 1013 *Pardee St., Berkeley, Calif.*

An aluminum hoist assembly that lifts and positions fluorescent fixtures reduced manpower requirements 50% and saved $50 per day on labor cost for a total of $3,000 on the installation of 1,200 four-foot and eight-foot fixtures in a recent installation, according to Fishback & Moore, electrical contractor. The hoist assembly is attached to a standard aluminum or steel scaffold and raises fixtures to the installation position on lifting arms that elevate along vertical tracks by a winch operated from the scaffold.



Bar Hanger

(23) *Steel City Electric Co., Pittsburgh 33, Pa.*

Two new adjustable bar hangers designed to save valuable installation time in dry wallboard and plaster construction has been announced by Steel City Electric.

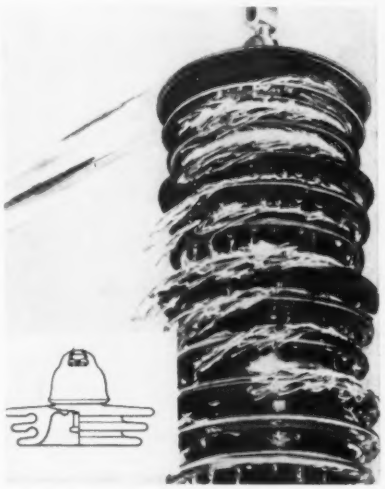
Preset depth of footed end plates enables the electrician to set and mount hangers accurately for plaster or dry wallboard finishing. The foot of the end plate seats against the bottom of the joist and is automatically positioned. Integral nail-like prongs on each end plate permits quick mounting of the bar hanger without nails.

Baseboard Heater

(24) *Markel Electric Products Inc., Buffalo, N. Y.*

New style baseboard equipment for the portable trade includes model No. 12T, 1,000-w, 3-ft unit and the 14T, 1,500-w, 4-ft unit. Case of the new models is finished in charcoal grey and white with brass control plate.

This unit is equipped with a built-in automatic thermostat and guide light. The new construction incorporates a double baffle, permitting the air flow behind, in front and around the element. Surface temperatures are comfortable to the touch, the manufacturer states.



Fog-Type Insulator

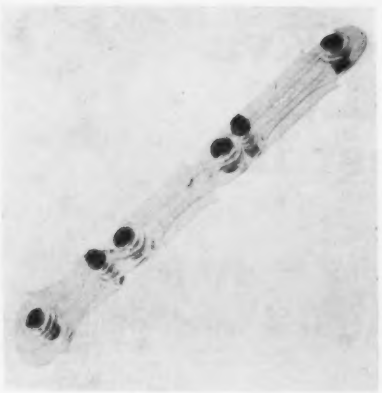
(25) *Delta-Star Electric Division, H. K. Porter Co. Inc., 2437 Fulton St., Chicago 12, Ill.*

A new fog-type insulator, claimed to have a 50% greater leakage distance than conventional units, has been announced by this company's Thomas Works. The new insulator is recommended for use where heavy fog or industrial contamination presents a serious maintenance problem.

Baseboard Heater

(26) *Berko Electric Mfg. Corp., 212-40 Jamaica Ave., Queens Village 28, N. Y.*

A two-foot glass radiant baseboard heater, rated at 600 w, has been announced by this company. The heating element requires no fan for circulation and may be wired for either 120- or 240-v operation, according to the manufacturer.



Vertical Cable Clamp

(27) *Hendrix Wire & Cable Corp., Milford, N. H.*

A new 15-kv vertical Hendri-Clamp spacer for aerial cables is made available by Hendrix Wire & Cable Corp. The new, higher voltage vertical clamp consists of two identical halves of molded Plexiglas, which are secured together by a single Plexiglas assembly nut and bolt with self-locking threads. The unit provides for a messenger and three conductor cables, each spaced approximately 6½ in. apart vertically. Split neoprene bushings have inside diameters to fit the specific messenger and phase conductors.

Compact Trencher

(28) *Auburn Machine Works, Auburn, Neb.*

This company has developed a self-propelled trencher in a small package. The single-unit body is constructed of heavy steel plate, rigidly reinforced and electrically welded.

Unique Magnetic System

free-floating...surge resistant...self-cleaning

The true magnetic flotation principle used in the Sangamo J3 Watthour Meter is unique! Two bonded cylindrical Alnico magnets with opposing magnetic fields float the disk freely.

The extra high coercive force Alnico material used in the magnetic system retains its strength even through repeated lightning and load surges, assuring accurate long-term registration.

Sangamo manufactures the magnets for precise magnetic and mechanical uniformity to assure performance stability in the J3 floating system. These magnets maintain a visible 1/16 inch cushion—magnetic particles are repelled from the gap . . . eliminating erratic light load registration.

This true magnetic floating system is designed for easy and positive control of disk position and endshake. It never requires costly maintenance or replacement . . . the floating system is guaranteed for the life of the meter.

true MAGNETIC flotation

J3

SANGAMO ELECTRIC COMPANY

SPRINGFIELD ILLINOIS

PW61-3

Get $1.12 worth of usable Kva for every $1.00 you invest in

WAGNER®

More for Your Money in Mechanical Features:

PLASTIC-COATED COVER

A porcelain-like coating gives improved corrosion resistance to tank covers, protects from line to ground, insulates small animals from the grounded cover to prevent outages. Applied to the covers, clamping ring and cover bolts, it is available without extra cost on all transformers with cover mounted bushings.

LONG LASTING TANK FINISH

A new formula anti-corrosive paint, carefully applied and thoroughly cured, provides a "Sure Seal" finish that withstands all temperature changes—is much longer lasting in corrosive atmospheres.

SAFETY KEYED BUSHINGS

Heavy wet-process porcelain high voltage bushings are safety-keyed. All terminals are key-locked in the tank wall. Hand tightening terminals are easily hooked up without tools. All bushings are suitable for use with either aluminum or copper conductor.

ROLLED-UNDER BASES

This new base design provides extra strength . . . better moisture drainage. Serves as an additional safeguard against leakage of oil from the tank. It lessens the chance for finish damage due to scraping.

HI-THERMAL-CAP

WAGNER® HIGH CAPABILITY TRANSFORMER
112% NAMEPLATE KVA 65°C. HOT SPOT RISE

TRANSFORMERS

Prize investment, these Wagner® Hi-Thermal-Cap Transformers. Wise buys in High Capability Distribution Transformers that pay off in one dollar and twelve cents worth of usable kva for every dollar of their cost. Solid performers that you can safely uprate to 112% of their nameplate kva without shortening their normal life expectancy, *and without exceeding the allowable 65°C hot spot temperature rise.*

We've built new, compact coils for these money-savers. They're wound LV-HV-LV around one insulating cylinder, and locked into sections of great mechanical strength by corrugated oil ducts and thermosetting insulation. Short circuit tests using 50 times normal current (twice as much as the industry standard) didn't even faze them.

The HI-THERMAL-CAP element, which combines this improved coil with a wound core of cold-rolled oriented grain steel, has excellent electrical characteristics: low impedance for better voltage regulation; low core and copper loss for economical operation. The result: you get top efficiency *plus* high capability with these transformers.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation

6381 PLYMOUTH AVENUE, ST. LOUIS 33, MISSOURI

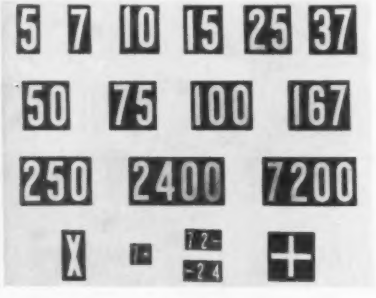
HI-THERMAL-CAP TRANSFORMERS are available in singlephase ratings of 167 kva and smaller, 15 KV and below for direct pole mounting. You can get them from factory, branch or distributor stocks now. And you can get complete information from your Wagner Sales Engineer. Check with him, or write us.

WT61-2

Cable Joint Sleeve

(29) *G&W Electric Specialty Co., 3500 W. 127th St., Blue Island, Ill.*

The G&W Universal Protection Kit consists of a plastic sleeve long enough to cover the cable joint or termination to be temporarily protected, waterproof paper to keep the plastic clean, tape, desiccant and humidity indicator. The sleeve is slipped over one of the cables to be spliced and covered with waterproof paper to keep it clean. Splicing proceeds until the work must be left. The sleeve is then pulled over the unfinished joint as shown in the illustration and one end taped tightly to the cable. Desiccant and humidity indicator are then inserted into the sleeve and its remaining end taped to the cable on the other side of the joint. The waterproof paper is laid over the whole as additional protection.



Decal Transfer Name Plates

(31) *Meyercord Co., 5323 W. Lake St., Chicago 44, Ill.*

The Pennsylvania Transformer Division of McGraw Edison Co. has for some time marked its outdoor transformers with this company's vinyl transfers. The transfers have a match-grey background with easily read chrome yellow numerals. The larger decals in the series are approximately 3 in. high with 2½ in. numerals. Meyercord now offers its facilities to anyone needing specifically engineered decals for any commercial surface or operating condition.

Outdoor Outlet

(32) *Park Metal Products Co., 16347 Sherwood Ave., Detroit 34, Mich.*

A weatherproof outdoor outlet unit, for installation in mobile home parks next to each trailer home, has recently been developed for use in connection with underground electric distribution systems. All internal wiring is included in each unit and is grounded to meet safety code requirements. Circuit breakers and receptacles are in one compartment and utility lines in another. Both compartments may be locked. The park owner may specify the receptacles to be used and wiring is done to his utility company specifications. Units are shipped complete, ready to install.

Rigid Fishing Rope

(33) *Jet Line Products Inc., 615 Fugate Ave., Charlotte, N. C.*

Jet Line introduces a new rigid rope, made of nonconductive polyethylene, designed for fishing conduit of any type or size. The rope is flexible and weighs only 14 oz per 50-ft length, will not rust or separate and tests at 800-lb pull, according to the manufacturer.

Pocket Transmitter

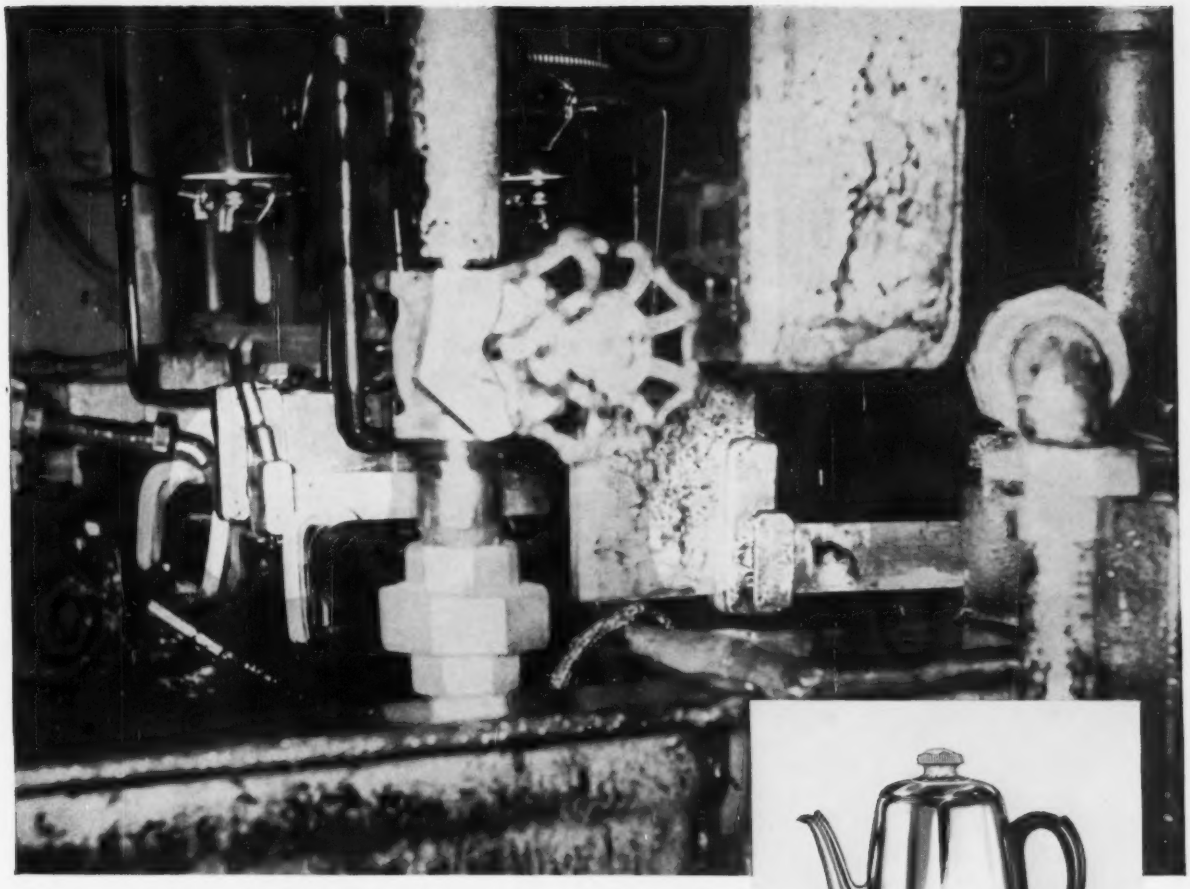
(34) *Motorola Inc., Communications and Industrial Electronics Division, 4501 W. Augusta Blvd., Chicago 51, Ill.*

This company has introduced a fully transistorized FM radio transmitter to operate on standard VHF two-way mobile communications frequencies. The miniature transmitter can be used to communicate with mobile radio phones and/or base stations and can also serve as a mate to the recently introduced pocket-size VHF receiver. These units are recommended for use with wire stringing crews or for keeping in touch with switching station personnel who are in the switchyard.

Current Limiting Circuit Breakers

(35) *I-T-E Circuit Breaker Co., 1900 Hamilton St., Philadelphia 30, Pa.*

The new I-T-E K-Don L-V circuit breaker combines current limiting fuses with features of this company's K-Line stored energy breaker in a single switchgear compartment. This combination is said to give high-speed protection against high-capacity faults up to 200,000 amp with a trigger fuse device that prevents single phasing.



SUNBEAM uses CADWELD® bus bar connections

CADWELD BUS BAR CONNECTIONS are used by SUNBEAM MANUFACTURING CORP. in chrome plating their automatic percolators because of top electrical efficiency under a severe corrosive environment and high current loads.

CADWELD CONNECTIONS are fusion welds and have no mechanical contact surfaces that can be affected by acid drippings as are bolted connections.

Illustrated in the above (unretouched) photo are the main feeder connections to the anode bars over the plating tanks.

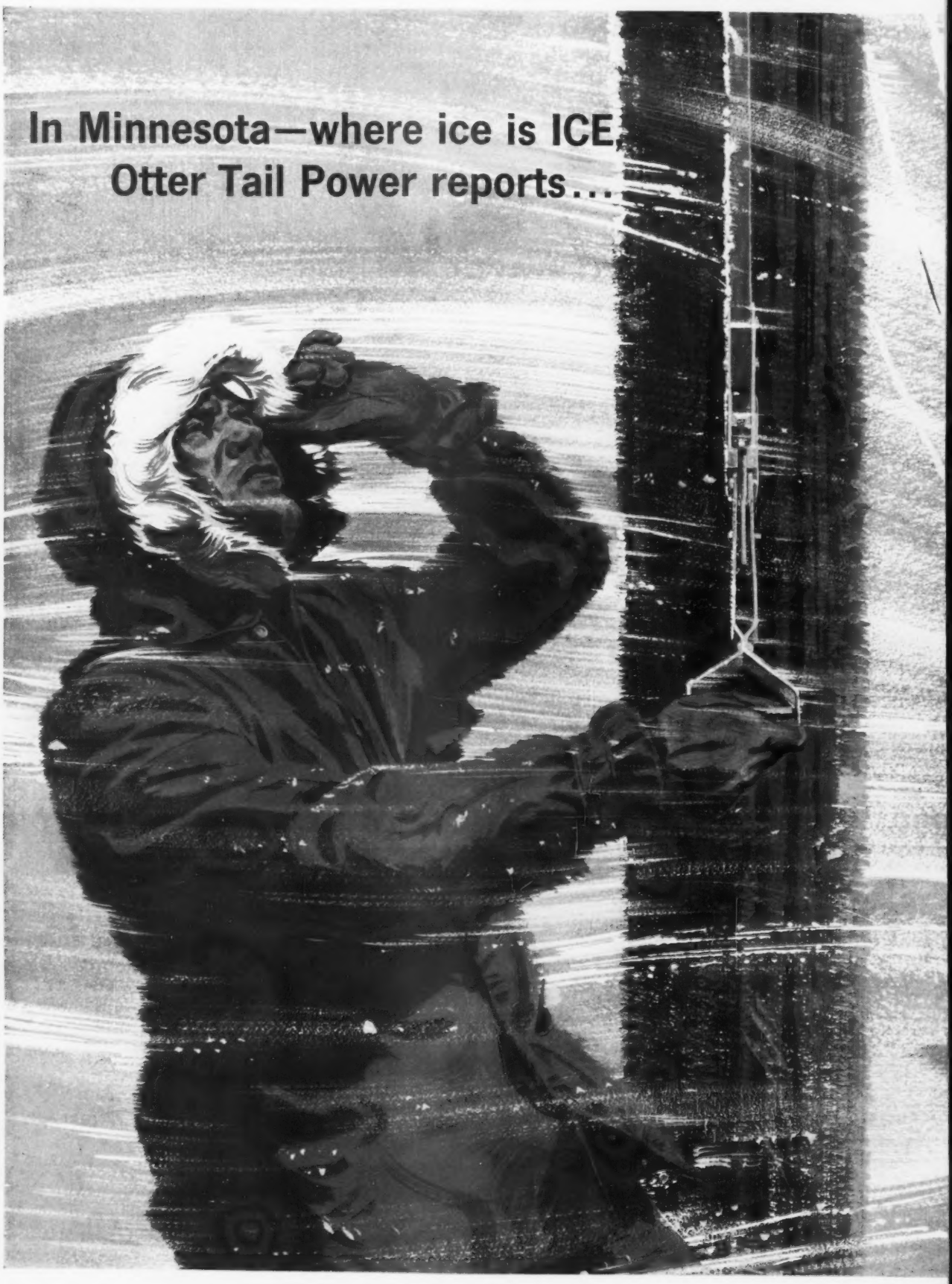
CADWELD CONNECTIONS are ideally suited for automatic plating installations and offer maintenance-free, minimum overall cost.

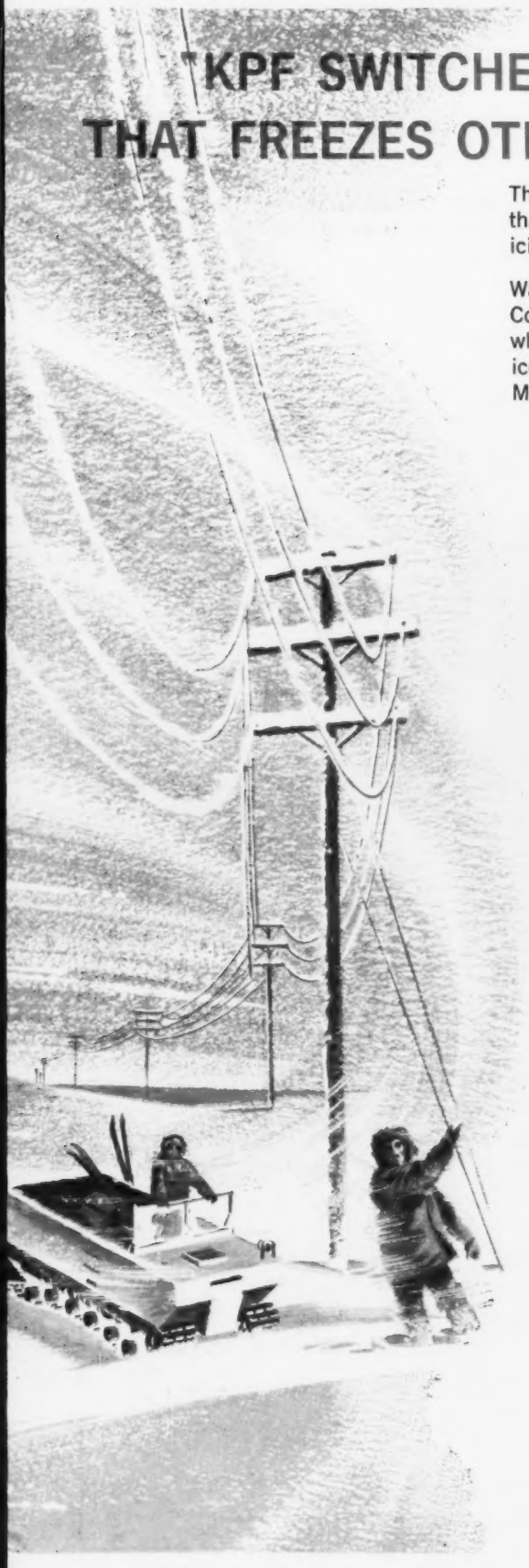
CADWELD® electrical connections

Erico Products, Inc.

2070 E. 61st Place • Cleveland 3, Ohio

IN CANADA: ERICO INCORPORATED, 7 Superior Ave., Toronto 14, Ontario, Canada


In Minnesota—where ice is ICE,
Otter Tail Power reports...



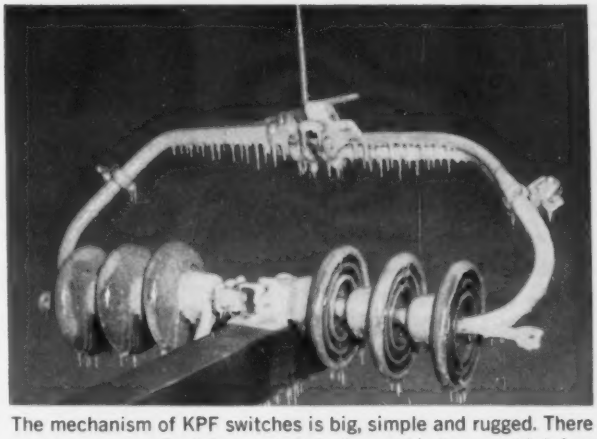
"KPF SWITCHES OPERATE UNDER ICE THAT FREEZES OTHER SWITCHES SOLID!"

The hard clear ice of northwestern winters — and the silver thaws of Texas — probably provide utility men with as much icing trouble as any set of conditions in the United States.

Warren Nye, Vice President, Electrical, of Otter Tail Power Company, has had his share of 80 mile per hour winter winds, whipping iced lines, and poles and switches sheathed in pure ice. Writing from his Company's headquarters at Fergus Falls, Minnesota, Mr. Nye says succinctly,

"We have found KPF switches easier to operate under conditions of ice than any other switch we have ever used."

HOW KPF SWITCHES CRACK OFF ICE



The mechanism of KPF switches is big, simple and rugged. There are no complex, finnicky doodads to freeze, bind or need lubrication.

A simple, positive-action control rod moves an interphase rod which rotates the blade arms of KPF phase units.

Blades and stationary clip holders are flexible so the moving arms can, literally, be "rocked" or "wobbled" by one man at the operating lever below.

The force exerted at the switchblade-clip holder position is many times that required to crack off the thickest natural ice.

The only time KPF switches have been not immediately operable under ice was when the entire pole and control rod assembly itself was sheathed in ice. It was necessary to clear ice to reach the operating lever and effect the "cracking off" process.

Install a KPF unit in your most demanding location – and watch its dependable, easy operation

KPF ELECTRIC COMPANY

P. O. Box 1257W • Stockton, California

HOward 4-8381 — Area Code 209

KPF

AIR BREAK SWITCHES

Standard for half a century

6380

THEY STAY ON.....

All VICTOR "MAGIC" CLAMPS and STRAPS for Thin and Heavy Wall Conduits have this time-saving snap-on feature.

Contractors everywhere are switching to VICTOR. Cash in on this heavy demand. Add these fast selling, profitable Clamps and Straps to your line.

Write for the new Victor Strap Catalog. Lists over 600 items to fasten Wire, Cable, Tubing and Conduit.

VICTOR SPECIALTIES, INC.
775 MAIN ST., NEW ROCHELLE, N.Y.

The Greatest Single Source for Clamps and Straps

California Representatives:

STANLEY SALES CORP.
1122 Folsom Street
San Francisco 3, Calif.
Phone: UNderhill 3-8900

HAYJAX COMPANY
436 Colyton Street
Los Angeles 13, Calif.
Phone: MA 8-5256

GIBBONS

Power Connectors and Bus Fittings

for COPPER or ALUMINUM

51 Styles 600 Sizes

Made in The West

Send for Catalog

GIBBONS ELECTRIC COMPANY
P. O. Box 63, SANTA CLARA, CALIF.
CHerry 3-6698 918 DiGiulio Ave.

Successors to bus fitting activity of Federal Pacific Electric Co.

BULLETINS

(36) **FIXTURES**—Technical data and general information on its Skyway series recessed fluorescent lighting fixtures is offered in a 40-page brochure from Globe Illumination Co. of Los Angeles. Ask for B-1.

(37) **SELECTOR CHART**—A revised silicone rubber selector chart (CDS-145C) is available from General Electric Co. at Waterford, N. Y.

(38) **OUTDOOR LIGHTING**—A new catalog from Stonco Electric Products Co., Kenilworth, N. J., condenses information about the company's line of cast aluminum outdoor floodlights and fixtures. Write for S-61.

(39) **SUBSTATION**—The Regu/Tran compact substation is described by Allis-Chalmers in Bulletin 61B9756. This unit is said to be low in initial and installation cost and to have fewer parts to assemble at the site.

(40) **FITTINGS**—Appleton Electric Co. has issued Bulletin AL60 describing its new "copper free" aluminum electrical fitting line. Containing less than 1% copper content, these fittings are said to be particularly suited for use where there are severe corrosive conditions. They can be used with either ferrous alloy or aluminum conduit; form their own natural coating of corrosion resistant aluminum oxide.

(41) **ANCHORS**—A four-page price and technical bulletin, No. 760, on P-L guy wire earth anchors has been released by Pieper-Lillard Division of Jasper Blackburn Corp., 1525 Woodson Road, St. Louis 14, Mo.

(42) **POWER CENTERS** — General Electric's Cabinetrol power centers are described in Bulletin GEA-7080. These units are engineered and custom-built to customer specifications.

(43) **LEASING PLAN**—An industrial truck rent-lease-purchase plan is outlined in a new booklet available from Hyster Co., P. O. Box 4318, Portland 8, Ore.

(44) **COATINGS**—Coated glass fabrics for electrical applications are listed in a new brochure offered by Irvington Division, Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul 6, Minn.

(45) **BUSHINGS**—Ohio Brass Co. of Mansfield, Ohio, has issued a new folder listing its condenser bushings from 15 kv through 196 kv. Included are transformer and circuit breaker bushings of two general types: Class LK with resin-paper core and Class GK with oil-impregnated paper core.

(46) **DISTRIBUTION CENTERS** — New dry-type integral distribution centers featuring quiet, high-temperature dry-type transformers for applications up to 5,000 v are described in a 20-page publication prepared by General Electric Co., Schenectady 5, N. Y. Ask for GEA-6928A.

(47) **FLOOR BOX**—Its improved model of the 800 standard floor box and a new 800-CI series cast iron floor box are described by National Electric Division, H. K. Porter Co. in a new catalogue section. This form No. 705 is available from the manufacturer at branch offices or at headquarters in the Porter Bldg., Pittsburgh 19, Pa.

(48) **LIGHTING**—Its Fairview line is covered by Day-Brite in the January issue of Day-Briter. Write the manufacturer at St. Louis, Mo.

(49) **INDUSTRIAL F UNITS**—Bulletin F from Benjamin Division of Thomas Industries describes a new line of industrial fluorescent fixtures. Available from the manufacturer at 207 E. Broadway, Louisville, Ky.

(50) **BREAKERS**—Construction and design features of its intermediate outdoor oil circuit breakers (type FZO) are described by Allis-Chalmers in Bulletin 71B8475, available from headquarters at Milwaukee 1, Wis.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after April 1

Please send me, without obligation, the new product information or catalogs.

If described in Product News, circle item number

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50														

If described in advertising, fill in page number

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

*Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

Blackburn Laboratories Develop New, Improved contax®

(Oxide-inhibiting compound)

HARMLESS TO LINEMEN'S GLOVES AND IMPROVES CONNECTION PERFORMANCE

Extensive laboratory tests by Blackburn, confirmed by an independent manufacturer of rubber goods, prove conclusively that BLACKBURN'S Contax has no adverse effect on linemen's rubber gloves and blankets.

In addition, Contax gives improved connection performance. It penetrates the oxides on conductors to reduce connection resistance. It inhibits oxidation and galvanic corrosion by sealing out moisture and air from the connection surfaces.

Contax comes in crack-proof, see-through, plastic squeeze bottles. It's a non-petroleum, synthetic polymer grease with suspended zinc particles . . . has an extremely low moisture absorption rate, and is usable over a wide temperature range. Contax is non-toxic and flame resistant . . . will not harm the skin.

For detailed test data, send for Data Folder #6009.

Jasper BLACKBURN Corporation

1525 Woodson Road **St. Louis 14, Missouri**

Keeping line clearance costs DOWN goodwill UP

Proven power equipment and Davey trained rope climbers . . . that's what makes Davey Surgical Line Clearance so economical. Utilities can rely on the dependable, efficient, and *adaptable* Davey crew. It will pay you to talk over your tree maintenance problems with the West's leading line clearing specialists—Call Davey.

DAVEY
TREE SURGERY CO., LTD.
OF CALIFORNIA

SAN FRANCISCO • Russ Building
LOS ANGELES • Story Building

ELECTRICAL ENGINEERS:

Constant innovations in already complicated construction make Estimating a distinct and exacting profession, requiring constant research. There can be substantial difference in cost between two apparently similar projects.

Thus, more and more owners, architects and engineers are using our estimating service. It includes:

1. Preliminary estimates to keep building costs within budgetary limits.
2. Comparative costs of alternative designs, materials, equipment, systems, schemes, etc. as an aid in selecting the materials, etc. most suited to each project.
3. Final cost estimates, the quantities of which may be furnished as an aid to bidders or as a basis of fair competition.
4. Cost estimates of desired changes during construction.
5. Checking of contractor's estimates of work in support of partial payments.
6. Construction cost counselors from beginning of preliminary plans to final completion of project.

Ask us for complete details of our estimating service for Electrical Engineers.

LeRoy Construction Services

768 Brannan Street San Francisco 3
UN 1-2483

Proposed Western Projects

Pacific Southwest

Phoenix, Ariz., Western Savings & Loan Assn., four-story office, $1,000,000. Plans by Calvin Butler.

Tucson, Kerr-McGee Oil Industries, Oklahoma City, 2½ mcf gas daily capacity helium extraction plant, $1,500,000.

Anaheim, Calif., Disneyland, 10-story hotel, exhibition and banquet hall, golf center, $6,000,000. Wheeler & Gray, Pasadena, consulting engineers.

Anaheim, High School District, 10-building South Junior High School, $1,000,000; Rio Vista School, $2,500,000. Plans by Smith, Powell & Morgridge, Los Angeles.

Costa Mesa, Union School District, schools, $3,000,000.

Fontana, Linde Co. Div., Union Carbide Co., Tonawanda, N. Y., liquid hydrogen plant, $32,000,000.

Los Angeles, Los Angeles County, motion picture and television museum, $4,000,000. Plans by William L. Pereira & Associates.

Lancaster, Los Angeles Co., kitchen and dining room, Mira Loma Facility, $756,125. Plans by Arthur Wolfe.

La Puente, Herziger Construction Corp., Whittier, 93 dwellings, $1,250,000. Plans by Raymond Dean Conwell, Los Angeles.

Poway, Richber Building Corp., 68 residences and garages, $800,000.

Point Arguello, 11th Naval District, San Diego, Air Force launch complex, $8,000,000-$10,000,000.

Orange, Sherlock Homes, Riverside, 139 dwellings, $1,501,200.

Simi, Larwin Co., Beverly Hills, 102 dwellings, $986,000.

Woodland Hills, Don-Ja-Ron Corp., Beverly Hills, 44 dwellings, $1,043,900. Charles E. Dubois, Encino, architect.

Ventura, Oasis Development Co., Los Angeles, senior citizens housing, $10,000,000.

Pacific Northwest

Belmont, Calif., six 12-story apartments, eight-story office building, shopping center, $10,000,000. Mogens Mogensen & Associates, architects.

Fremont, General Motors Corp., Chevrolet Division, Detroit, Mich., assembly plant.

Milpitas, shopping center, office, bowling alley, $3,000,000. Robert B. Liles, San Francisco, architect.

Santa Barbara, Tutor Lehrhoff

Co., Sherman Oaks, 100-bed hospital and medical building, $2,000,000.

San Jose, hospital, $1,500,000. Hohn Carl Warnecke & Associates, San Francisco, architects.

Payette, Idaho, junior high school, $400,000.

Reno, Nev., General Services Administration, Washington, D. C., courthouse and federal office, $4,000,000. Plans by Lockard, Casazza Parsons & Associates.

Hoquiam, Rayonier Inc., New York, steel, concrete pulp bleaching plant addition, $2,400,000. Sandwell International, Vancouver, B. C., consulting engineers.

Seattle, Marketime Drugs and Lucky Stores, store, parking lot, $1,500,000. L. Swedberg, Tacoma, architect.

Seattle, YMCA, dormitory, $2,680,000.

Seattle, University of Washington, Roberts Hall addition, $1,500,000; Bagley Hall remodeling, $1,341,000.

Spokane, Gonzaga University, student housing, $1,533,550.

Hawaii and Alaska

Anchorage, Alaska, State Department Public Works, Juneau, two-story airport terminal addition, $4,500,000. Plans by Fay, Spofford & Thorndike and Tryck, Nyman & Associates.

Fairbanks, State Department Public Works, Juneau, airport terminal, $2,500,000. Plans by Fay, Spofford & Thorndike and Tryck, Nyman & Associates, Anchorage.

Kailua, Honolulu, Hawaii, Centex Construction Co., 104 homes, $1,800,000. R. Milam, contractor-architect.

Kaneohe, Clyde & Frank Yamamoto, bowling alley, $1,500,000. Plans by Takashi Anbe, Honolulu.

Honolulu, City and County of Honolulu, three-deck parking garage, $400,000.

Rocky Mountain

Boulder, Colo., Frasier Meadows, bowling alley, $600,000. Plans by John F. Milan & Associates, Denver.

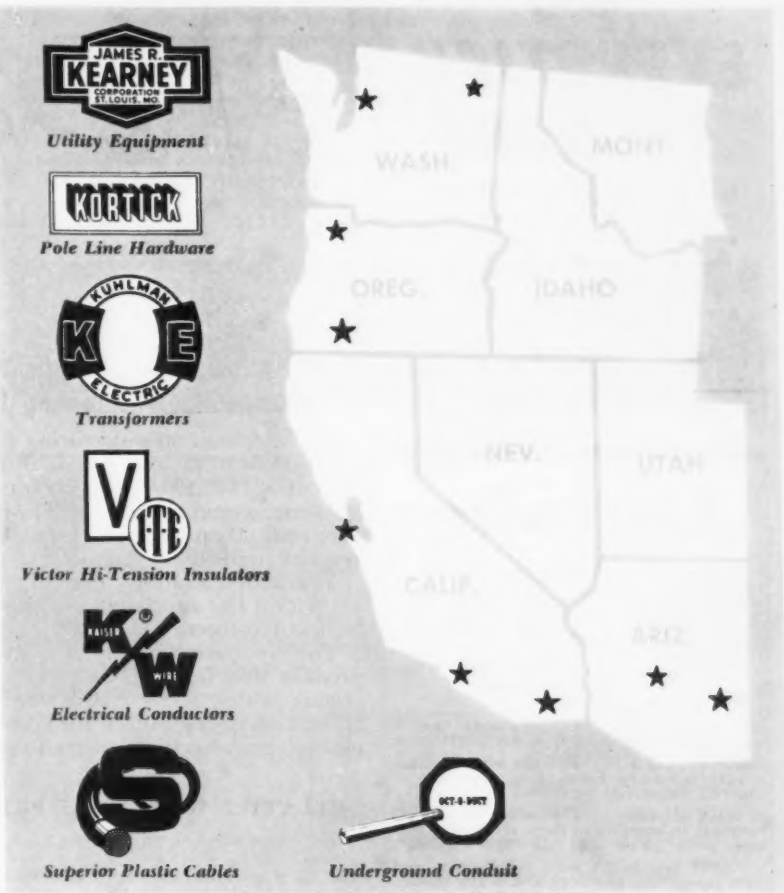
Billings, Mont., School District No. 2, school addition, $535,000; South Billings junior high school, $1,700,000; elementary schools and additions, $1,200,000.

Noxon, School District No. 10, elementary and high school, $545,000. Plans by Taylor, Thon, Schwartz & Kirkpatrict, Kalispell.

Artesia, N. M., hospital, $625,000. Brittelle, Ginner & Dekker, architects.

MAYDWELL & HARTZELL
INCORPORATED
Engineering Sales Representatives

OVERHEAD AND UNDERGROUND
UTILITY EQUIPMENT
for Western Users



Complete Stocks
Transmission, Distribution & Communication Line Materials
At Strategic Locations

Sales Offices and Warehouses

San Francisco 7	870 Tennessee Street	ATwater 8-6900
Los Angeles 13	427 W. Fifth Street	MAdison 8-7245
San Diego 20	5823 Henley Drive	JUniper 2-6749
Phoenix	120 So. 29th St.	BRidge 5-7644
Portland 10	2318 N.W. Vaughn Street	CApitol 8-4173
Medford	203 Genessee	SPring 2-9195
Seattle 9	306 Dexter Avenue	MAin 4-2368
Spokane 8	121 S. Monroe Street	MAdison 4-3285
Tucson	110 East 6th Street	MAin 2-3331

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life

EVERSTICK ANCHORS

For new construction and maintenance — Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resiliant, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

Latrobe

FULLMAN'S
Adjustable
STEEL BOX

190-N R Series
No Receptacle

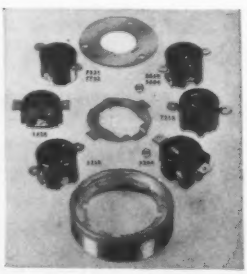
This 4" standard octagon, brass-topped, watertight, 2½" deep box is our #190 series.

Box-body has a 3¼" opening which makes it easy for whole hand access from top of concrete to bottom of floor.

A brass adjusting ring with ½" height adjustment in addition to three screw legs 2½" long, gives quick and easy "tru-leveling".

A "KEY" which fits most popular size and style receptacles has been added at no extra cost.

TO INSTALL—Drop the "KEY" (shown in center of photo) into special slots built into adjusting ring—select the receptacle required and simply "LAY-IN"; then "LAY-ON" receptacle ring.



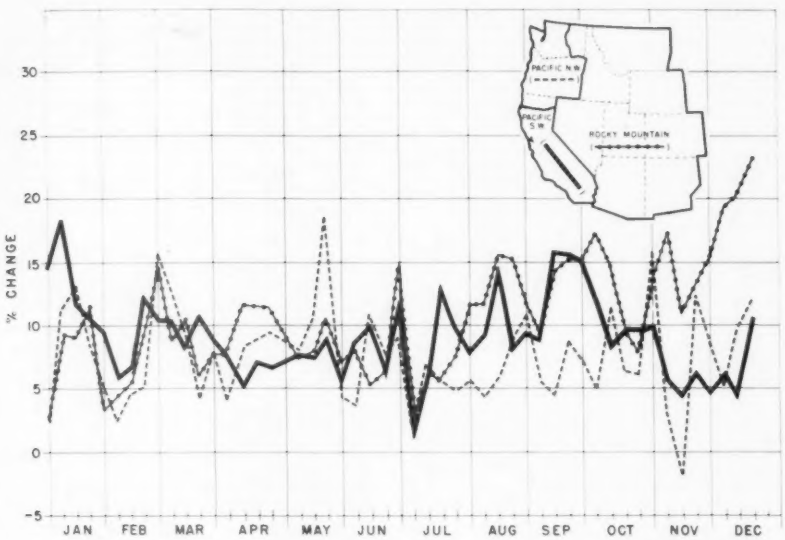
SOLD THRU WHOLESALERS

FULLMAN MANUFACTURING CO.
LATROBE . . . PENNSYLVANIA

WESTERN BUSINESS TRENDS &

Output Comparisons

Year-to-Year Kwh Output Changes. Per Cent Change Over Same Week One Year Ago for Region as Indicated in Keyed Map



Electrical Manufacturers Hit Peak in 1960; Cautious Concerning 1961

The electrical manufacturing industry took 1960 business and talk of recession in stride as the value of factory shipments reached a new all-time high of $22,622,800,000—an increase of 5% over the 1959 mark of $21,522,900,000, according to Joseph F. Miller, managing director of the National Electrical Manufacturers Assn. The previous peak was $21,900,000,000 reached in 1956.

The above totals include all electrical products, whether or not they are within the association's scope, and cover shipments by nonmembers as well as members.

The association views 1961 with considerable caution, however, and predicts that business, in general, could rise slightly to $22,795,500,000, remain at 1960 levels or drift downward by as much as 5%. Much depends on an anticipated gain in the economy during the latter half of 1961, since most electrical manufacturers forecast a slow first half, Miller stated.

RELATIVE WHOLESALE PRICES OF ELECTRICAL MATERIAL

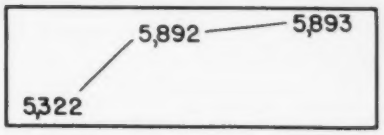
	LATEST MONTH	PREVIOUS MONTH	YEAR AGO
Wire and cable	130.2	132.3	141.7
Watt-hour meters	120.9	120.9	120.9
10-hp motors	132.0	132.0	154.9
225-hp motors	208.8	208.8	223.9
Hydro generators	185.5	185.5	198.5
Steam generators	203.5	203.5	203.5
15-kva transformers	133.0	133.0	133.5
50-kva transformers	134.7	134.7	141.2
500-kva transformers	147.1	147.1	160.0
Dry-type transformers	133.7	133.7	149.6
Switch and fuse panelboards	129.4	126.0	132.4
Circuit breaker panelboards	137.9	136.7	139.1
Indoor oil circuit breakers	182.5	182.5	182.5
Outdoor oil circuit breakers	156.3	156.3	213.5

Source: McGraw-Hill Department of Economics

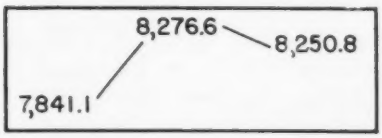
INDICATORS

Economy at a Glance

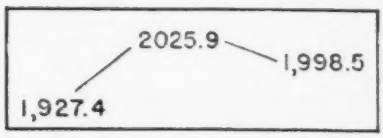
Year Ago	Month Ago	Latest Month



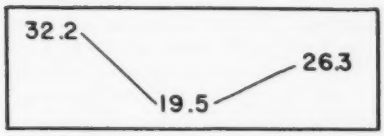
PERSONAL INCOME in millions—seasonally adjusted as of Dec. 15 (An index of consumer spending potential)



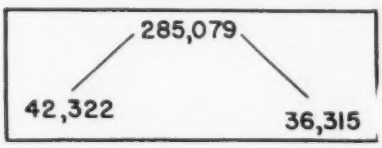
NONFARM EMPLOYMENT in thousands (An index of total industrial and commercial activity)



MANUFACTURING EMPLOYMENT in thousands (A measure of manufacturing activity)



HOUSING STARTS in thousands of units (Index of new residential customers)

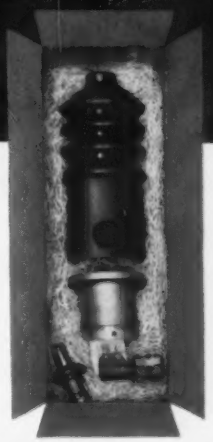


INDUSTRIAL BUILDING CONTRACTS in thousands of dollars (A rough index to the dollars of electrical contracting business six months to a year ahead)

► Government figure factories will market a host of new statistical products if the Eisenhower budget recommendations go through. Among them: a study to check out the suspicion that elderly and middle-aged ladies are sneaking into the ranks of folk counted as jobless, making unemployment totals look more menacing than they really are.

Sources: Business Week, Bureau of Labor Statistics, Construction Daily, Engineering News-Record and The Wall Street Journal.

G&W POTHEAD UNIT PACKAGING
speeds installation; cuts inventory and costs!

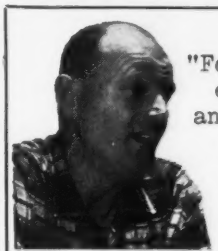


Every component, device, and accessory required for installing a G&W standard Pothead is quickly gathered from "off-the-shelf", carefully and securely packaged, and shipped *complete* in a single carton. Once put into inventory, the needed number of potheads may be drawn from stock, unpacked right at job-site, and put into service in short order. Not only are substantial inventory savings affected, but installation costs materially are reduced.

Unit Packaging is another benefit gained from G&W's constant development of cable accessories and switchgear; another reason why it profits you to recommend, specify, and install G&W equipment. Ask a G&W representative, or write for information about G&W potheads and terminations.

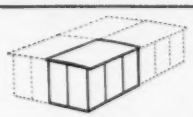
G&W standard capnut Pothead ready for shipment as a typical Unit Package.

G&W ELECTRIC SPECIALTY COMPANY
3506 WEST 127TH STREET • BLUE ISLAND, ILLINOIS
CANADIAN MFR. • POWERLITE DEVICES, LTD. TORONTO, MONTREAL & VANCOUVER
superior quality standards — inspired specialized design
G61-1



"For a combination electrical field office and storage shed that's quick to move on and off the job, I like Porta House. We have them on several jobs."

Just telephone Porta House collect and get immediate delivery. Prefabricated, bolted, waterproof plywood panels—can be moved on a pick-up truck.



SIZES 6' OR MORE BY 9' OR MORE.

PORTA HOUSE
Ridgely K. Dodge 6767 Broadway Terrace, Oakland, Calif.
Phone collect for immediate delivery: OLympic 2-7237

Distributor (Sales & Rentals): Porta House, 8833 So. Alameda St., Los Angeles 2 • LUdlow 3-1301

ELECTRICAL CONTRACTORS:

You waste a lot of time and money bidding on many jobs you do not get. This costly waste cuts deeply into your profits and you do not make the money you should. We can furnish you excellent electrical estimating service at a saving of over 50% of your present estimating costs. We can furnish you take-offs and man hours only, or we can furnish complete estimates showing detail lists of materials, at current unit prices, and man-hours and labor costs, together with a detailed list of overhead items and profit. You can check each item of our estimate and compare it with your own. Thus you get the benefit of two independent estimators in the preparation of your bids, all at a definite saving in estimating cost.

Call us for complete information; without obligation, of course.

LeROY CONSTRUCTION SERVICES
768 Brannan Street UN 1-2483 San Francisco 3

ELECTRICAL WEST

provides every essential for effective advertising coverage of the West

1. The most complete Western circulation of any electrical magazine (over 3,500 more than nearest competitor)
2. Nearly three times the Western utility circulation of any electrical magazine (utilities were responsible for over 70% of electrical construction budgets in 1960)
3. The key to the fastest growing area in the country both in population and electrical construction (by 1975 Western population will increase by 54% while the rest of the country increases less than 25%)
4. A shot at the THIRD straight $1,000,000,000 Western electrical construction budget
5. Over 70% coverage of all executive & supervisory employees in a large Western utility. Write for Maydwell & Hartzell survey.
6. Evaluation of advertising impact: Readerscope studies measure readership of ads and editorial*

** Call your nearest McGraw-Hill office for more information*

IF YOU ARE NOT ADVERTISING IN

ELECTRICAL WEST

YOU ARE NOT SELLING HARD ENOUGH IN THE WEST

255 California Street, San Francisco 11, California

A McGRAW-HILL PUBLICATION

Spokesman of the Electrical Industry of the West for 74 Years

Trading Post

Space in the Trading Post is available at $4 per line per issue with a minimum of three lines — more than seven lines — $18 per inch. Write to Trading Post, Electrical West, 255 California St., San Francisco 11, Calif.

Eastern manufacturer of quality baseboard and panel heaters wants qualified representatives in Seattle, Portland, San Francisco and Los Angeles. Must have good distributor contacts. Refer to Dept. MR101.

Manufacturer of electrical radiant heating system wants northern California representatives. Refer to Dept. MR102.

Southern California manufacturer of transmission line construction specialties wants representatives in the Pacific Northwest and Rocky Mountain areas. Refer to Dept. MR106.

Sales engineer, 38, with seven years' service for one of country's largest corporations wants opportunity in small aggressive company. Location must be in the West. Refer to Dept. MR107.

Long-established manufacturers' representative organization with offices in northern and southern California is looking for recognized lines to round out distribution equipment package for electric utility customers. Warehouse facilities available. Refer to Dept. MR109.

Major style leader bringing out new line needs representation in states of Arizona, Nevada, Colorado, Utah, New Mexico, Idaho, Montana, Wyoming as well as cities of Los Angeles and San Diego, Calif. Man must have following and experience with electrical distributors. Please state qualifications, experience and references. Refer to Dept. MR110.

ELECTRICAL TESTING SERVICE

D.C. HI-POTENTIAL
ANY PLACE — ANY TIME
• INSULATION RESISTANCE
Charter Industrial Engineering Co.
Phone: YUkon 1-0427
• DIELECTRIC ABSORPTION
for New Installations

Preventative Maintenance Programs

465 California St., San Francisco 4, Calif.

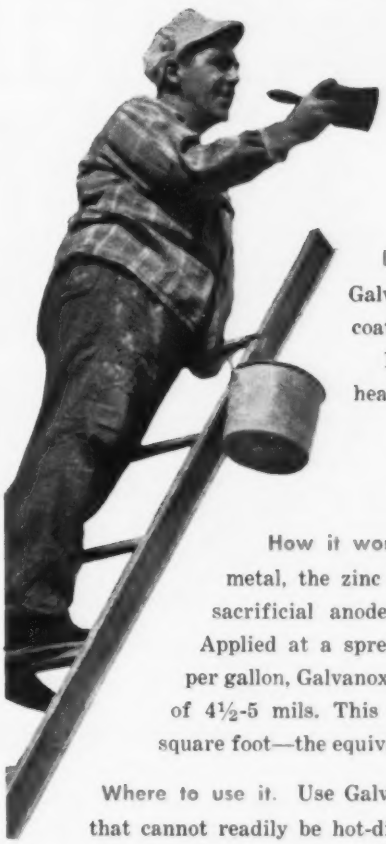
Index to Advertisers

February 1961

Allis-Chalmers Mfg. Co.	13, 15
Blackburn Corp., Jasper	107
Bullard Co., E. D.	12
Burndy Corp.	25
Central Transformer Corp.	46, 47
Chance Co., A. B.	48
Charter Industrial Eng. Co.	112
Condon Co., Earl S.	98
Copperweld Steel Co.	8, 9
Davey Tree Surgery Co.	108
Delta Star Electric Div., H. K. Porter Co., Inc.	4th Cover
Duncan Electric Co. Inc.	11
Eagle Electric Mfg. Co. Inc.	86
Electrical Fittings Corp.	82
Electrical Tubular Products	87
Electrical West	112
Electro-Motive Div., General Motors Corp.	38, 39
Erico Products Inc.	103
Everstick Anchor Co.	110
Fanner Mfg. Co.	6
Federal Pacific Electric Co.	22, 23
Fisher Pierce Co. Inc.	29, 88, 89
Fullman Mfg. Co.	110
G & W Electric Specialty Co.	111
Gedney Electric Co.	3rd Cover
Gibbons Electric Co.	106
Holan Corporation	10
Holophane Co. Inc.	51
I-T-E Circuit Breaker Co., BullDog Electric Products Div.	93
Indiana Steel & Wire Co. Inc.	44
Johns-Manville Corp.	28
KPF Electric Co.	104, 105
Killark Electric Mfg. Co.	90
Kuhlman Electric Co.	2nd Cover
LeRoy Construction Services	108, 111
Line Material Industries, Inc.	3
Maydwell & Hartzell, Inc.	109
Moloney Electric Co.	84, 85
National Supply Div., Armco Steel Corp.	14
Newport News Shipbuilding & Drydock Co.	24
Ohio Brass Co.	94, 95
Olin Conductors	31
Orangeburg Mfg. Co. Inc.	17
Pacific Gas and Electric Co.	30
Pennsylvania Transformer Div.	16
Petersen Engineering Co. Inc.	91
Pfaff & Kendall	42
Preformed Line Products Co.	18, 19
Porta House	111
Rome Cable Div. Alcoa	21
Royal Electric Corp.	43
R T & E Corp.	7
S & C Electric Co.	32, 33
Sangamo Electric Co.	99
Southern California Edison Co.	20
Southern States Equipment Corp.	4, 5
Subox, Inc.	113
Truck Equipment Co.	49
Victor Specialties, Inc.	106
Wagner Electric Corp.	100, 101

Next to Hot-Dip Galvanizing

GALVANOX



DOES IT BEST

Like a paint, but not a paint. Galvanox is a ready-mixed organic coating saturated with metallic zinc It requires no curing agent or heat treatment. Brushed or sprayed on, it provides electro-chemical protection not possible with ordinary paints.

How it works. In direct contact with base metal, the zinc particles in Galvanox act as a sacrificial anode to establish a galvanic cell. Applied at a spread rate of 150-200 square feet per gallon, Galvanox establishes a dry film thickness of 4½-5 mils. This deposits 2 ounces of zinc per square foot—the equivalent of new hot-dip galvanizing.

Where to use it. Use Galvanox to coat any iron members that cannot readily be hot-dip galvanized. Use it to restore galvanized areas damaged during fabrication or construction. Use it to cover welds, drill holes and untreated rivet and bolt heads. Use it to renovate galvanized hardware and guys, pipes, structures and equipment.

Send for a copy of "Galvanox by Subox."

SUBOX PAINTS

Subox Inc.

Trade Mark

Established 1924

The Ambler Co., Denver, Colo.
Fred W. Carlson & Assoc., Butte, Mont.; Seattle, Wash.
Wm. J. Cottrell & Assoc., Portland, Ore.
R. E. Cunningham & Son, Los Angeles, Calif.
Wrathall & Krusi, San Francisco, Calif.
Plant and office: Hackensack, New Jersey
Subox Co. of Canada, Weston, Ontario

Estimator's Guide

Prices shown are for new construction cost in place. Quotations furnished by LeRoy Construction Service

The figures in this guide, furnished by LeRoy Construction Service, will be kept up to date and published periodically. This guide is for your use. Will you please let the editor know if there are other figures or ideas which would make this section more valuable to you?

Residential Wiring

PER OUTLET, 120 V—2 WIRE		
Knob & tube	Each	8.50
Nonmetallic cable	Each	8.00
Armored cable (BXL)	Each	16.00
Armored Cable (BX)	Each	10.00
Flexible metallic conduit	Each	18.00
EMT	Each	20.00
Conduit rigid	Each	23.00
PER OUTLET, 230 v—3 Wire (RANGE—OVEN—WALL HEATER)		
Nonmetallic cable (Romex)	Each	14.00
Flex conduit (Greenfield)	Each	22.00
EMT	Each	23.00
SERVICE & PANEL		
Light panel & service 50 amp lugs 120/240 v—3 wire 4 1 pole circuit, 15 amp fused		70.00
Light panel & service 100 amp ACB 120/240 v—3 wire 4 1 pole circuit, 15 amp 2 2 pole circuit, 20 to 50 amp		150.00
Light panel & service 100 amp—ACB 120/240 v 6 1 pole circuit, 15 amp 3 2 pole circuit, 20 to 50 amp		165.00
Light panel & service 100 amp—ACB 120/208 v, 3 phase, 4 wire 8 1 pole circuit, 15 amp 2 2 pole circuit, 20 to 50 amp 2 3 pole circuit, 15 to 30 amp (Required for air conditioning system)		225.00
INSTALL LIGHT FIXTURES (Fixtures Purchased on Allowance)		
Incandescent	Each	4.00
Fluorescent	Each	5.00
Yard light	Each	5.00
Bathroom exhaust fan	Each	50.00
Garden pedestal light fixture	Each	40.00

Commercial Wiring—Conduit

FLEXIBLE METALLIC	Per C
½"	32.50-36.00
¾"	37.50-43.50
1"	63.00-69.00

RIGID GALVANIZED	Per C
½"	49.00- 54.00
¾"	62.00- 68.00
1"	79.50- 87.00
1¼"	103.00-115.00
1½"	121.50-132.00
2"	160.00-175.00
2½"	229.00-252.00
3"	298.50-325.00
3½"	365.50-401.00
4"	417.50-456.00
5"	624.50-685.00

Commercial Wiring—EMT

	Per C
½"	34.50- 38.00
¾"	43.50- 48.00
1"	58.00- 64.00
1¼"	83.00- 90.00
1½"	70.50- 76.00
2"	103.00-112.00

Commercial Wiring—RHW

WIRE 600 V—75°	Per M
750 mcm, stranded	2,011.00-2,090.00
700 mcm, stranded	1,867.00-1,940.00
600 mcm, stranded	1,675.00-1,742.00
500 mcm, stranded	1,401.00-1,457.00
400 mcm, stranded	1,140.00-1,185.00
300 mcm, stranded	923.00- 960.00
250 mcm, stranded	830.00- 860.00
No. 4/0, stranded	690.00- 717.00
No. 3/0, stranded	567.00- 589.00
No. 2/0, stranded	451.00- 965.00
No. 1/0, stranded	378.50- 393.00
No. 1, stranded	322.50- 335.00
No. 2, stranded	240.00- 249.00
No. 4, stranded	182.50- 190.00
No. 6, stranded	137.00- 142.00
No. 8, stranded	106.50- 110.00
No. 10, stranded	80.50- 83.00
No. 12, stranded	66.00- 68.00
No. 14, stranded	57.00- 59.00
No. 8, solid	99.00- 102.00
No. 10, solid	75.00- 78.00
No. 12, solid	61.00- 63.00
No. 14, solid	52.50- 54.00

Commercial Wiring—TW

WIRE 600 V—75°	Per M
750 mcm, stranded	1,850.00-1,924.00
600 mcm, stranded	1,537.00-1,598.00
500 mcm, stranded	1,300.00-1,350.00
400 mcm, stranded	1,017.00-1,057.00
300 mcm, stranded	850.00- 882.00
250 mcm, stranded	750.00- 780.00
No. 4/0, stranded	635.50- 660.00
No. 3/0, stranded	543.00- 564.00
No. 2/0, stranded	432.50- 449.00
No. 1/0, stranded	556.50- 370.00
No. 1, stranded	306.00- 318.00
No. 2, stranded	227.00- 236.00
No. 4, stranded	173.00- 179.00
No. 6, stranded	129.50- 134.00
No. 8, stranded	95.00- 98.00
No. 10, stranded	73.00- 75.00
No. 12, stranded	59.50- 61.00
No. 14, stranded	51.50- 53.00
No. 8, solid	87.00- 90.00
No. 10, solid	68.00- 70.00
No. 12, solid	55.00- 57.00
No. 14, solid	47.50- 49.00

Commercial—Outlets & Connections

Conduit and wire not included

	Each
Light fixture outlet	
Recess	8.00
Surface	7.00
WP	8.00
Duplex outlet	
15 amp	9.00
15 amp WP	10.00
Clock outlet	9.00
Floor outlet, flush	17.00
Floor outlet, pedestal type	23.00
Outlet, 240 v, 3 wire, 1 phase, 30 to 50 amp	13.00
Outlet, 240 v, 4 wire, 3 phase, 30 to 50 amp	16.00
Switch, single pole	9.00
Switch, double pole	10.00
Switch, 3 way	10.00
Switch, single pole w/pilot	12.00
Switch, momentary contact	10.00

Motor Outlet & Connection

GREENFIELD FLEXIBLE CONDUIT	Each
Fractional hp, 120 v, 1 phase	11.00
Fractional to 3 hp, 240 v, 3 phase	13.00
5 to 10 hp, 240 v, 3 phase	14.50
15 to 25 hp, 240 v, 3 phase	18.00
30 to 50 hp., 240 v, 3 phase	26.50
60 to 100 hp, 480 v, 3 phase	35.00
For Sealtite add 25%	
For explosionproof add 50%	

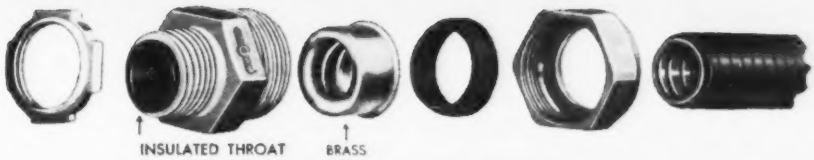
Power & Control Equipment

MOTOR DISC. SWITCH TYPE C NONFUSIBLE STD. DUTY 250 V	Each
30 amp, 2 pole, 240 v	19.00
30 amp, 3 pole, 240 v	21.50
60 amp, 3 pole, 240 v	34.00
100 amp, 3 pole, 240 v	52.00
200 amp, 3 pole, 240 v	84.50
400 amp, 3 pole, 240 v	178.00
600 amp, 3 pole, 240 v	280.00
30 amp, 3 pole, 575 v	22.00
60 amp, 3 pole, 575 v	36.00
100 amp, 3 pole, 575 v	54.00
200 amp, 3 pole, 575 v	88.00
400 amp, 3 pole, 575 v	184.00
600 amp, 3 pole, 575 v	290.00
PUSHBUTTON STATION	
NEMA 1, std. duty	
One button	14.50
Two button	17.00
Three button	22.50
NEMA 1, heavy duty	
One button	20.00
Two button	27.00
Three button	34.00
NEMA 4 & 5, std. duty	
One button	32.50
Two button	34.00
Three button	38.50
NEMA 4 & 5, heavy duty	
One button	37.50
Two button	42.50
Three button	61.00
MOTOR STARTERS—MANUAL	
Size 00—1 pole, 120/208 v	17.00
Size 00—2 pole, 240/480 v	19.00
Size 0—2 pole, 240/480 v	32.00
Size 1—2 pole, 240/480 v	37.00
Size 0—3 pole, 240/480 v	41.00
Size 1—3 pole, 240/480 v	46.00
MOTOR STARTERS—MAGNETIC RESET ONLY IN COVER	
Size 0—2 pole, single phase	47.00
Size 1—2 pole, single phase	52.00
Size 1½—2 pole, single phase	67.00
Size 0—3 pole, 3 phase	55.00
Size 1—3 pole, 3 phase	60.00
Size 2—3 pole, 3 phase	107.00
Size 3—3 pole, 3 phase	173.00
Size 4—3 pole, 3 phase	365.00
MOTOR STARTERS—MAGNETIC START, STOP, RESET IN COVER	
Size 0—2 pole, single phase	56.00
Size 1—2 pole, single phase	62.00
Size 1½—2 pole, single phase	77.00
Size 0—3 pole, 3 phase	63.00
Size 2—3 pole, 3 phase	68.00
Size 2—3 pole, 3 phase	116.00
Size 3—3 pole, 3 phase	183.00
Size 4—3 pole, 3 phase	374.00
UNDERFLOOR DUCT SYSTEM	
Duct, No. 2, single run, including junction boxes and misc. ftgs., etc.	Per ft 2.90
Duct No 4, single run, including junction boxes and misc. ftgs. etc.	Per ft 3.20
Pedestal underfloor duct outlet, power	Each 16.50
Pedestal underfloor duct outlet, telephone	Each 14.00

TO LOCATE WESTERN SUPPLIERS OF ELECTRICAL PRODUCTS

Look it up first in

ELECTRICAL WEST'S BUYERS' GUIDE & MANUFACTURERS' DIRECTORY – 1961 Edition sent to all subscribers in November. Extra copies available $1.00 each. Write to Circulation Manager, Electrical West, 255 California St., San Francisco 11, Calif.



Malleable Iron Liquid-Tite Connectors

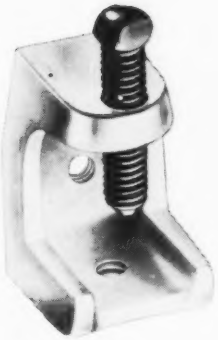
QUALITY MALLEABLE IRON FITTINGS ARE AVAILABLE!

GEDNEY'S

Complete Line is Precision-Made of Unbreakable Malleable Iron . . .

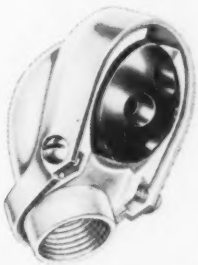
- *Unmatched for Toughness*
- *Impervious to Corrosion*

GEDNEY FITTINGS FIT

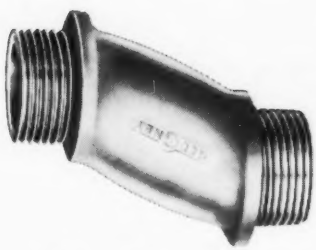


M.I. Beam Clamps

M.I. 90° Corner Adapters and Corner Elbows

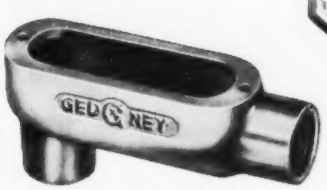


M.I. Entrance Caps



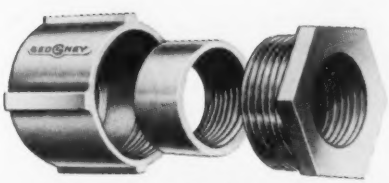
M.I. Offset Connectors and Offset Nipples

M.I. Insulated Bushings

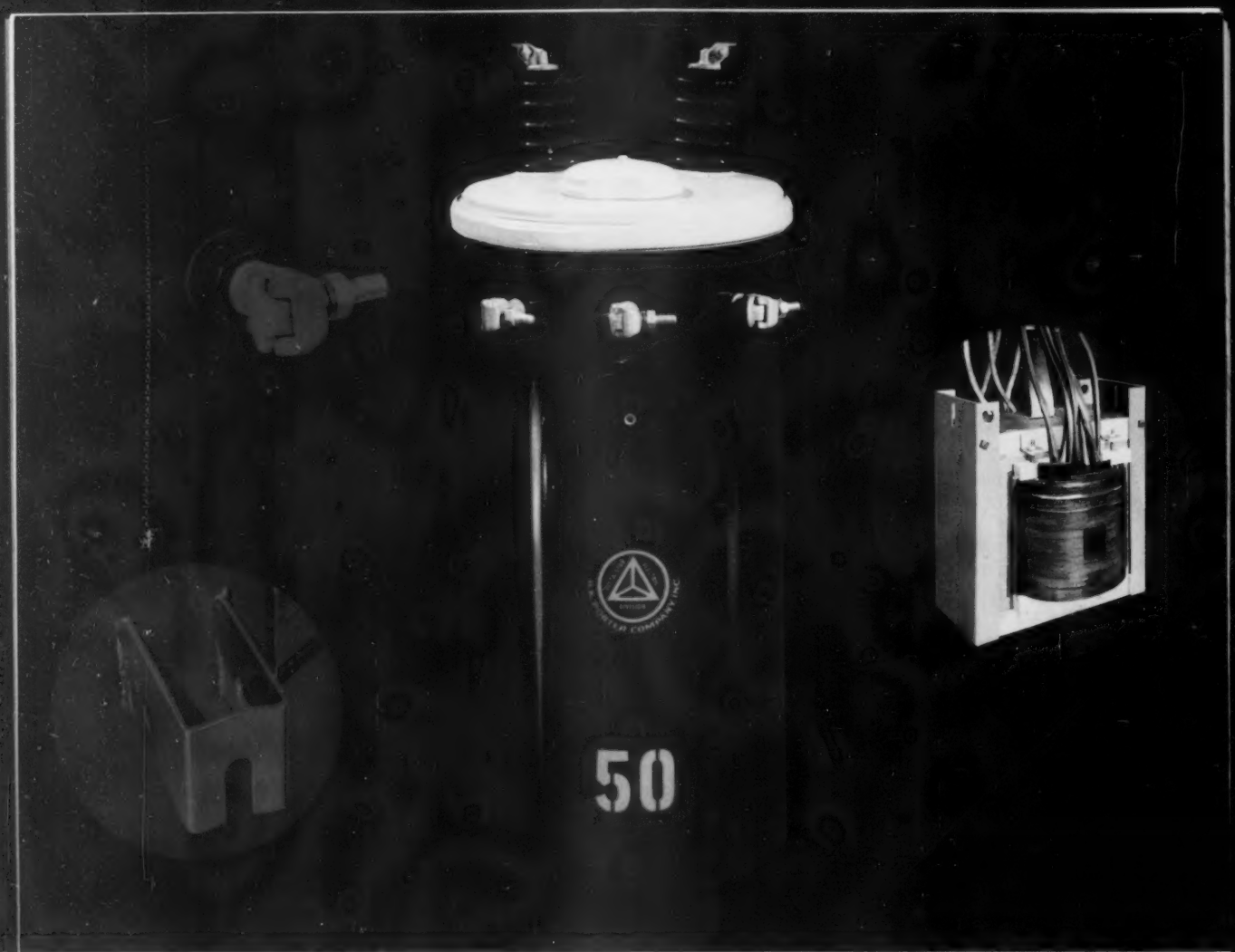


M.I. Conduit Bodies

M.I. Armored Cable & Non Metallic Connectors



M.I. 3 Piece Conduit Couplings



The difference that doesn't show....SUPERIOR PERFORMANCE !

This is the all-new Delta-Star utility transformer for the West...distinctively different in design. Different because it is engineered specifically for utility systems—from inside to out. Among its design features are the absence of cooling fins on a 50 KVA...high domed cellulosic coated cover for squirrel protection...special plated terminals for better connection to copper or aluminum... high strength continuous welds to eliminate water traps. But a more important difference is inside *...in performance!* New standards for economical operation are set by an exclusive new Delta-Star designed coil. Lower loss ratio—improved voltage regulation—increased revenues! A complete list of all test—and field proven advantages in this new Delta-Star series is of interest to every engineer. Obtain full details today by contacting the Delta-Star office that serves your Western area—

Delta-Star Electric Division, 1030 Washington Street, San Carlos, California, or from— Delta-Star sales offices at Albuquerque, Denver, Los Angeles, Phoenix, Salt Lake City, San Francisco, Seattle, Tucson.

DELTA-STAR PORTER **ELECTRIC DIVISION**
H. K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.